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Background Document for Third Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions. Volume 3. Proposed Rule Third Third Waste Volumes, Characteristics, and Required and Available Treatment Capacity. Chapter 4. Appendices

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Background Document For Third Third Wastes To Support 40 CFR Part 268 Land Disposal Restrictions

Proposed Rule

Third Third Waste Volumes, Characteristics, and Required and Available Treatment Capacity

Volume III

CHAPTER 4
APPENDICES

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This document supports the proposed rule for the Third Third of the wastes scheduled for restriction from land disposal under Section 3004(m) of RCRA. It presents the estimates of the quantities of wastes that will require alternative treatment and recovery prior to land disposal. It also presents estimates of alternative treatment and recovery capacity available to manage wastes restricted from land disposal, taking into account the demands already placed on that capacity by previous land disposal restrictions.

This section of the background document presents a detailed discussioin of the methodology (approach) and rationale for the capacity analysis supporting this proposed rule.

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THIRD THIRD WASTES TO SUPPORT 40 CFR
PART 268 LAND DISPOSAL RESTRICTIONS

PROPOSED RULE

THIRD THIRD WASTE VOLUMES, CHARACTERISTICS,
AND REQUIRED AND AVAILABLE TREATMENT CAPACITY

Volume III

CHAPTER 4
APPENDICES

U.S. Environmental Protection Agency
Office of Solid Waste
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4. CAPACITY ANALYSIS METHODOLOGY

This section of the background document presents a detailed discussion of the methodology (approach) and rationale for the capacity analyses supporting this proposed rule.

Section 4.1 includes a brief discussion of the data sources and the technical review and quality control procedures associated with the creation of the waste volume data set used for capacity analysis. Section 4.1 also presents a detailed discussion of the methodology used for determining the required alternative capacity for land disposed wastes (demand). Section 4.2 provides a detailed discussion of the determination of available alternative capacity (supply) and the creation of the alternative capacity data sets used for the analysis. Finally, Section 4.3 describes the methodology used to compare the waste volumes and the associated required alternative capacity (demand) with the supply of available capacity to determine whether adequate capacity exists to support the land disposal restrictions.

4.1 Determination of Required Treatment Capacity

This section presents a detailed discussion of the analytical methodology used to determine the demand for alternative treatment capacity required by wastes affected by the Third Third proposed rule.

4.1.1 Waste Volumes Affected

To assess the requirements for alternative treatment capacity that will result from the Third Third proposed restrictions, including contaminated soils, it was necessary to identify waste volumes by land disposal method, waste code, and physical/chemical form. With this information, it is possible to identify which treatment technologies are applicable to the waste volumes and to determine required alternative treatment capacity.

(1) Data Sources

The TSDR Survey, which includes data from the CWM-Emelle Chemical Waste Management data bases described earlier in Section 2.1.1, was the primary source used to estimate surface disposed waste volumes. The TSDR Survey data base was the primary source used to estimate underground injected waste volumes.

(2) Identification of Waste Volumes

Land-disposed Third Third proposed wastes were identified on a waste code basis. For wastes described by a single waste code, the volume was allocated to the appropriate waste code.

For waste groups (mixed wastes and/or wastes described by more than one RCRA waste code), the entire volume was included in the regulatory group of the highest priority code in the group. For example, if a waste group was described by both a solvent waste code (F001-F005) and a Third Third proposed code, the entire waste volume was assigned to solvents because they were restricted prior to Third Third wastes.

Consequently, to avoid double-counting, only waste volumes for waste groups containing a Third Third proposed code but no solvents, First Third wastes for which a treatment standard was promulgated on August 8, 1988 (i.e., non-soft hammer First Third wastes), or Second Third promulgated wastes (i.e., non-soft hammer Second Third wastes) have been included in today's estimates of required capacity unless promulgated standards are being revised. Furthermore, if a waste group contained more than one Third Third proposed code but no previously restricted codes, the volume was divided equally among the Third Third proposed codes.

(3) Determination of Affected Volumes

Land disposal is defined under RCRA as any placement of hazardous waste into or on the land. Therefore, storage and treatment of hazardous waste in or on the land is also considered land disposal. Land disposal methods can be divided into numerous categories. Five types of land disposal are addressed in detail in this document: disposal in landfills; treatment and storage in waste piles; disposal by land application; treatment, storage, and disposal in surface impoundments; and underground injection. Utilization of salt dome formations, salt bed formations, and underground mines and caves are additional methods of land disposal that are affected by this rulemaking. Currently, there is insufficient information to document the volumes of Third Third proposed wastes disposed of by these last three methods; therefore, they are not addressed in the analysis of volumes and required alternative treatment capacity.

Estimates of the volumes of affected wastes that have been stored (but not treated or disposed of) in surface impoundments or waste piles are presented. Storage implies a temporary placement of wastes in the surface impoundment or waste pile. EPA has assumed that all of the affected wastes stored in surface impoundments are eventually treated or recycled or that they are routed to permanent disposal in other existing units. To avoid double-counting in this analysis (i.e., counting waste volumes once when they are stored and again when they are finally disposed of), the volumes of wastes reported as being stored in surface impoundments or waste piles were not included in the estimates of volumes requiring alternative treatment capacity. Nevertheless, these wastes will be affected by the restrictions and will require alternative storage capacity. However, if during the facility-level analysis of the responses to the TSDR Survey it was determined that wastes were being stored indefinitely in the impoundment or waste pile (i.e., long-term storage), these volumes were included as requiring alternative treatment capacity because they would not be counted elsewhere. If hazardous waste entered a waste pile or surface impoundment for storage in 1986 but no waste was reported as having been removed from the impoundment or waste pile for treatment or disposal prior to or during 1986, the waste was considered to have undergone long-term storage.

HSWA required that all surface impoundments be in compliance with certain minimum design and operating criteria (minimum technology requirements; see RCRA section 3005(j)) to continue receiving, treating, or storing hazardous waste beyond November 8, 1988. Furthermore, the land disposal restrictions, upon promulgation, forbid placement of restricted wastes in surface impoundments, except for treatment. Consequently, most surface impoundments were replaced by tanks, retrofitted to meet the minimum technical standards, or closed entirely by November 1988. However, because the baseline year for the TSDR Survey is 1986, the 1986 land disposed volumes do not reflect these changes. Therefore, a special analysis of the management of wastes in surface impoundments was conducted. As described in Section 2.1.1, if it could be determined from the survey responses or through facility follow-up that a treatment surface impoundment was being closed without replacement (i.e., the surface impoundment was to be bypassed because it was not crucial to the effective operation of the treatment system), was being replaced by tanks, or was being retrofitted, then the volume was dropped from further analysis of waste requiring alternative treatment capacity.

For surface impoundments used for treatment and long-term storage or for treatment and disposal that were being replaced by tanks or retrofitted, it was sometimes necessary to include the volume of treatment residual generated in the impoundment in 1986 in the volume requiring alternative treatment capacity. Because the impoundment was used for long-term storage or disposal of the treatment residual, the volume was not counted elsewhere as land disposal. Where it could be assumed that the treatment residual would continue to be generated after retrofitting or replacement, the volume of treatment residual generated on an annual basis (not the entire volume entering the impoundment for treatment), was included as requiring alternative treatment capacity. For example, if a facility reported that in 1986 it used a surface impoundment for treatment (settling) and disposal of a Third Third proposed hazardous waste but that in 1988 it was replacing the impoundment with a settling tank, the volume of waste entering the impoundment in 1986 would not require alternative treatment capacity because it would no longer be land disposed in 1988. However, the volume that settled for disposal in 1986 would still be generated in the tank in 1988 and would require alternative treatment capacity prior to disposal. The treatment residual volume would therefore be included in the volume of wastes requiring alternative treatment capacity. If, however, it was determined that the impoundment was a flow-through impoundment and that only incidental settling occurred (i.e., less than 1 percent of the volume entering was settled), then it was assumed that there would be essentially no settling when the impoundment was replaced by a tank.

The quantities included in the CWM-Emelle data represent the volumes of wastes shipped to CWM-Emelle for disposal by landfilling, but do not necessarily reflect the volumes of wastes actually landfilled. Even though a waste stream was reported with the final handling method representing landfill, it is possible that the waste stream was managed in a manner that could alter its volume prior to being landfilled. CWM-Emelle has a stabilization process and a solvent extraction/fuel blending operation onsite. For purposes of the Third Third proposed rule, it was assumed that the volume reported being received by CWM-Emelle was the volume landfilled because the actual volume of each waste stream landfilled could not be determined.

One exception to the above assumption involves organic sludges. CWM-Emelle provided additional information indicating that although the landfill handling method was reported as final disposition for some waste streams, only the residuals were landfilled. Based on this information, some of the organic sludge volumes were assumed not to have been land disposed.

4.1.2 Treatability Analysis

Those wastes that require alternative treatment/recovery because of the land disposal restrictions, once identified, must be analyzed to determine the types of alternative treatment required. This process is referred to as treatability analysis. This section discusses the methodology used to perform treatability analyses on the wastes identified as requiring alternative treatment/recovery. The results of the treatability analyses conducted on the waste streams used for this rulemaking are contained in Appendix F.

(1) Waste Characterization

Respondents to the TSDR Survey were asked to provide a limited waste characterization, including a waste code (or codes) and a waste description code (A/B codes), for each waste stream being land disposed. The A/B codes classify wastes, at a minimum, by the following general physical/chemical categories: inorganic liquids, sludges, solids, and gases and organic liquids, sludges, solids, and gases. The waste description codes, in some cases, also provide qualitative information on hazardous constituents or characteristics. The waste code and A/B code combinations were the primary source of characterization data used to assess treatability of the wastes.

A limited number of facilities, however, did not provide these codes If during technical review of the survey or facility follow-up, the facility was either unwilling or unable to provide these codes, engineering judgment was used to assign a waste description code. All available information from the survey was used to assign the waste description codes, including the survey responses and the facility schematic. These sources could provide information on previous management (e.g., whether the waste was a treatment residual), the origin of the waste (e.g., mixture rule and derived from rule wastes), and how the waste was being land disposed (e.g., no liquids in landfills).

In addition, for F and K coded wastes for which the facility did not provide waste description codes, the waste description in 40 CFR Part 261, as well as information contained in a report characterizing RCRA waste streams[1], was used to assign the waste to the most common physical/chemical form. Occasionally, it was not feasible to assign the waste to the most common form. For example, if the available information indicated that the waste was commonly a solid but the waste was being underground injected, it was assumed to be a liquid rather than a solid.

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[1] Metcalf and Eddy, Inc. 1985. Technologies applicable to hazardous waste. Briefing presented for the U.S. Environmental Protection Agency, Office of Research and Development, Hazardous Waste Engineering Research Laboratory, Cincinnati, Ohio.

P and U coded wastes for which the facility did not provide waste description codes were generally assigned to either off-spec or discarded products, contaminated soils, or aqueous cleanup residue, depending on the volume, management, and assumed physical/chemical form of each waste. Assumptions regarding the physical form were based on available information from the schematic or survey, including the methods of management or other available information on the chemical constituent such as the Condensed Chemical Dictionary.[2] For example, landfilled wastes were assumed to be either sludges or solids, and underground injected wastes were assumed to be liquids. If the volume of undescribed waste being land disposed was large (i.e., greater than 50 tons for solids or 1,000 gallons for liquids), the waste was assumed to be contaminated soil or aqueous waste derived from a cleanup operation. This was based on the assumption that, for economic reasons, only small volumes of off-spec products are likely to be produced, and therefore only small volumes would be land disposed.

Characteristic hazardous wastes (i.e., D waste codes) for which the facility did not provide waste description codes were generally assigned a waste description based on the method of land disposal used, any information from the schematic or other survey responses, and the characteristic represented by the particular D code as described in 40 CFR, Part 261. For example, pesticide wastes characteristically hazardous for their toxicity were generally considered organic, while toxic metal wastes were considered inorganic.

For the purposes of the TSDR Survey, certain X-codes were created to describe hazardous waste residuals that result from the on-site management of many individual RCRA coded wastes that are no longer individually identifiable. One such X-code was XLEA, which was used to describe leachate from hazardous waste landfills. To ensure that the X-codes were not being misused by respondents and that RCRA codes were being used when it was reasonable to do so, an attempt was made to "un-X" X-coded wastes that were reported as land disposed. In the case of XLEA, information from the facility schematic and facility notes, as well as information on the types of wastes entering the landfill, was used to assign RCRA codes to these wastes. However, because by definition these wastes should no longer be individually identifiable, very few X-coded wastes were assigned RCRA codes.

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[2] Hawley, Gressner G. The Condensed Chemical Dictionary. Van Nostrand Reinhold Company, New York, New York. 1981.

Waste characterization for the CWM-Emelle data was different from TSDR Survey data base because CWM-Emelle supplied brief descriptions of the wastes from their Biennial Report instead of A/B codes. The assignment of A/B codes to each waste stream reported landfilled was based on the RCRA waste code(s) and description provided by CWM-Emelle. When descriptions were inadequate to assess the physical/chemical form of the waste, some standard assumptions were required to assign the A/B codes. The first assumption was that the facility was operating in compliance with all regulations that were in effect during 1987. These regulations include the ban on liquids in landfills and the solvents rule, which restricted the land placement of liquid solvent wastes. This affects the assignment of A/B codes because it must be assumed that any land placed waste stream with a solvent code must either be a sludge or a solid. Also, during 1987, the landfilling of free liquids was banned; therefore, if a description of the waste indicates that the volume reported was a liquid, it was assumed to have been stabilized using CWM-Emelle's on-site stabilization process prior to landfilling.

For F and K coded wastes, the waste description in 40 CFR, Part 261, as well as information contained in a report characterizing RCRA waste streams[3], was used to determine the waste's most common physical/chemical form and assign an A/B code. F006 wastes, wastewater treatment sludges from electroplating operations, required an additional assumption. Cyanides are not always used in electroplating operations; therefore, cyanides are not always present in F006 waste. From the information available on the F006 waste streams land disposed at the CWM-Emelle facility, it is impossible to determine whether the waste streams contain cyanides. As a worst case scenario, all F006 waste streams were assumed to contain treatable levels of cyanides and therefore would require cyanide treatment.

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[3] Metcalf and Eddy, Inc. 1985. Technologies applicable to hazardous waste. Briefing presented for the U.S. Environmental Protection Agency, Office of Research and Development, Hazardous Waste Engineering Research Laboratory, Cincinnati, Ohio.

(2) Treatability Grouping/Assigning Alternative Treatment

As previously mentioned, EPA is required to establish treatment standards for those wastes being restricted from land disposal. The Agency has the option of either specifying the use of a particular technology or setting a concentration standard based on the performance of the best demonstrated available technology (BDAT). For the Third Third wastes, the Agency is generally proposing concentration standards based on the performance of BDAT; however, for some Third Third wastes EPA is proposing the use of the BDAT technology as a method of treatment.

Through use of the characterization data provided by the TSDR Survey, and the other data (i.e., the waste code and A/B code combinations, and consideration of the BDAT technologies identified by EPA) wastes were assessed for treatability and assigned to treatability groups. These treatability groups were then assigned to BDAT treatment or, in some cases, to alternative treatment that the Agency believes is capable of meeting the BDAT concentration treatment standard. For example, if the BDAT technology was identified as rotary kiln incineration, it was assumed that other types of incineration with the appropriate feed system would be able to achieve the BDAT standard. In addition, for this analysis, reuse as fuel was also assumed to be equivalent to incineration (incineration and reuse as fuel have been grouped under the general category of combustion), except where the BDAT standard specifies incineration as a method of treatment (e.g., P064).

Wastes with similar A/B codes that require the same BDAT were assigned to the same treatability groups. Alternative treatment/recovery technologies associated with each treatability group, and descriptions of each alternative treatment/recovery technology are documented in Analysis of Required Capacity Data for the Third Third Proposed Rule.[4]

In limited cases, waste streams could not be assigned to the treatability group representing the BDAT treatment because the physical/chemical form of the wastes were incompatible with the BDAT treatment. In these cases, an engineering analysis of each waste stream was conducted to assign the waste to an alternative technology believed capable of achieving the BDAT treatment standard. The results of these analyses for each waste stream are presented in the waste code-specific discussions in Section 3. The TSDR Survey does not contain data on the performance of treatment technologies; therefore, several alternative sources[5] and "best engineering judgment" were required to identify potential alternatives to BDAT.

A similar analysis was conducted for waste groups (i.e., mixed wastes). Waste groups are hazardous wastes that are described by more than one RCRA waste code, and they present special treatability problems in that they are often contaminated with hazardous constituents that may fall under more than one treatability group (e.g., organics and metals). Such waste groups usually cannot be assigned to only the BDAT technology for one specific waste type. Instead, a treatment train that is capable of treating sequentially each waste type in the group must be developed. Often these treatment trains can be developed by combining BDAT treatments in sequence, or by adding pre- or post-treatment steps to the BDAT technology. Treatment trains were developed using the references mentioned above and engineering judgment.

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[4] Versar. 1989. Analysis of Required Capacity Data for the Third Third Wastes Proposed Rule. Appendix C. Prepared for the Office of Solid Waste. Washington, D.C.: The U.S. Environmental Protection Agency.

[5] USEPA. 1985. U.S. Environmental Protection Agency. Physical-chemical properties and categorization of RCRA wastes according to volatility. EPA-450/3-85-007. Research Triangle Park, N.C.: U.S. Environmental Protection Agency.

IT Enviroscience, Inc. 1983. Survey of industrial applications of aqueous-phase activated-carbon adsorption for control of pollutant compounds from manufacture of organic compounds. Prepared for U.S. Environmental Protection Agency, Industrial Environmental Research Laboratory.

Metcalf and Eddy, Inc. 1985. Technologies applicable to hazardous waste. Briefing presented for the U.S. Environmental Protection Agency, Office of Research and Development, Hazardous Waste Engineering Research Laboratory, Cincinnati, Ohio.

Versar. 1985. Assessment of treatment technologies for hazardous waste and their restrictive waste characteristics. Draft Final Report. Prepared for the Office of Solid Waste. Washington, D.C.: U.S. Environmental Protection Agency.

USEPA. 1986. U.S. Environmental Protection Agency, Office of Solid Waste. Best demonstrated available technology (BDAT) background document for F001-F005 spent solvents. Vols. 1-3. EPA/530-SW-86-056. Washington, D.C.: U.S. Environmental Protection Agency.

(3) Treatment Residuals

Treatment technologies generate residuals that create capacity demand. For example, some wastes require incineration followed by stabilization of the incinerator ash and treatment of the scrubber water followed by stabilization of the resultant wastewater treatment sludge. Based on the TSDR Survey responses, it was determined that RCRA permitted incinerators have adequate air pollution control devices (APCD) (including scrubber water treatment at those facilities with wet scrubbers) and that the facilities considered the capacity of their APCDs and wastewater treatment systems when determining the capacity of their incinerators. Therefore, no attempt was made to evaluate capacity for treatment of scrubber waters. Wastewater treatment sludges and incinerator ash requiring stabilization, however, were included in the estimates of treatment residuals requiring capacity.

Although the entire waste volume would require incineration, only a portion of the original volume would require stabilization because the amount of ash and wastewater treatment sludge generated would be less than the original volume incinerated. To account for these changes in the volume within a treatment train, volume adjustment factors were developed. These factors were developed using engineering judgment and are dependent on the type of treatment and the physical/chemical form of the waste. The factors represent that percent of the original volume exiting the technology of concern as a residual. For example, the volume adjustment factor used to estimate the volume of ash generated from incineration of an organic sludge is

0.1, or 10 percent of the original volume, and the volume of scrubber water treatment sludge is estimated at 0.01 or 1 percent of the original volume. Therefore, if 100 gallons were incinerated, the volume adjustment factor would estimate that 10 gallons of ash and 1 gallon of wastewater (scrubber water) treatment sludge would be produced as residuals.

(4) Previous Management

Another important factor considered during the treatability analysis of a waste was any previous management. Using information contained in the TSDR Survey and the facility schematics, it was possible to evaluate the previous management, if any, for wastes being land disposed. Whenever possible, the previous management of land disposed wastes was evaluated in an attempt to determine whether the waste had already been treated by the BDAT technology or by a technology believed capable of achieving the BDAT treatment standard. If it could be determined that the waste had been previously treated by such a technology, the waste was assumed to meet the BDAT treatment standard. Such wastes would therefore not be prohibited from land disposal and were consequently not included in further analysis of the volume of wastes requiring alternative treatment/recovery capacity.

4.2 Determination of Available Treatment Capacity

This section presents a detailed discussion of the analytical methodology used to determine the estimates of alternative treatment and proposed recovery capacity available for wastes affected by the Third Third proposed rule. These processes include "combustion" in incinerators or industrial kilns, furnaces, and boilers, and "other treatment/recovery" processes including solidification/stabilization, solvent and liquid organic recovery for reuse, metals recovery, acid leaching of sludges, neutralization, and wastewater treatment for cyanides, metals, and organics. The discussion of combustion capacity is separate from the discussion of other treatment and recovery capacity. Combustion is predominantly a single unit process system; therefore, the combustion system analysis does not require locating and quantifying a limiting unit within a treatment train of unit processes as in the analysis of other treatment or recovery systems.

4.2.1 Determination of Combustion Capacity

(1) Introduction

The combustion data set was established to determine the following information for incineration and reuse as fuel: (1) the utilized capacity during the base or reference year of 1986; (2) the maximum capacity during 1986 and any planned changes through 1992; (3) the unused or available capacity during the periods 1986, 1987, 1988, 1989, and 1990-1992; and (4) the possible interchange of capacity between the various hazardous waste forms (feed capabilities) for these time periods should excess capacity exist for certain forms and shortfalls exist for others. The data set was generated by technical review and engineering evaluation of TSDR Survey responses and facility schematics, followed by development of the data set and data consolidation and aggregation to arrive at national totals.

For this rule, capacity data from only fully commercial incinerators were used to determine available capacity. These data represent the most readily available capacity, on a national level, to treat the wastes currently being considered under the land disposal restriction rules.

The incineration capacity data compiled for this proposed rule do not include information on two other potential categories of waste treatment capacity: limited commercial and captive facility capacity. "Limited commercial" facilities are those that accept wastes from only a limited number of facilities not under the same ownership--in many cases, only from their customers and/or clients. "Captive facilities" are those that manage wastes from other facilities under the same ownership. Although capacity from these types of facilities has not been included in this analysis, the Agency does not believe that available capacity from these sources would have affected any of the variance decisions for this rule.

To determine reuse as fuel capacity, data from facilities with fully and limited commercial industrial kilns, furnaces, or boilers were included. During review of the data set, it was discovered that most facilities with reuse as fuel units described themselves as limited commercial because they accept waste only from a limited number of facilities not under the same ownership, primarily fuel blenders or waste brokers. Because fuel blenders and waste brokers are typically fully commercial, capacity at these limited commercial reuse-as-fuel units was also considered fully commercial.

The capacity data set was compared to estimates of waste volumes currently being land disposed that will require combustion capacity to determine whether there is adequate incineration and reuse-as-fuel capacity for all waste forms. Combustion technologies lend themselves well to wastes that are difficult to treat by conventional treatment technologies and are very versatile in that they can treat the various waste forms (liquids, sludges, solids, and gases) with some interchangeability.

(2) Approach and Methodology

The data set was generated by review and engineering evaluation of TSDR Survey responses, transfer of data derived from the questionnaires to the computer data set, and final consolidation of all facility capacities to arrive at national totals. In some cases TSDR responses were updated based on follow-up investigation.

The questionnaires pertaining to incineration and reuse as fuel in the TSDR Survey were Questionnaire B, "Incineration," and Questionnaire C, "Reuse as Fuel." A copy of the two questionnaires can be found in the RCRA docket for this proposed rule.[6] The questionnaires were designed not only to provide actual utilization and maximum capacity data for each unit at the facility, but also to provide other design and operational information to enable the reviewer to evaluate the accuracy of the facility responses. These other data elements were the following:

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[6] US EPA. 1987. U.S. Environmental Protection Agency, Office of Solid Waste. National survey of hazardous waste treatment, storage, disposal, and recycling facilities. OMB No. 2050-0070.

- Operating/downtime information;
- Percent utilization;
- Maximum practical thermal rating;
- Average heating value of the hazardous and nonhazardous waste being treated;
- Maximum practical feed rate for each waste form;
- Planned capacity increases/decreases by time period;
- Type of solids that can be fed to the unit; and
- Waste characteristics that exclude or limit acceptance for treatment.

The above information was used by the reviewer, using mass/heat balances and other methods, to evaluate the validity of the facility responses to utilized and maximum capacity questions. If discrepancies in responses were identified, the reviewer would attempt to resolve the discrepancies and contact the facility by telephone to verify findings. If agreeable to the facility, the reviewer would adjust the data.

In addition, technical review of reported capacity data included the evaluation of incinerator or reuse-as-fuel support systems such as waste feed handling systems, air pollution control devices, scrubber water treatment systems, and ash handling systems.

The following types of incinerators were considered in the TSDR Survey:

- Liquid injection
- Rotary (or rocking) kiln
- Rotary kiln with liquid injection
- Two-stage
- Fixed hearth
- Multiple hearth
- Fluidized bed

- Infrared
- Fume/vapor
- Pyrolytic destructor
- Other (specify).

The following types of units were considered in the Reuse as Fuel questionnaire:

- Cement kiln
- Aggregate kiln
- Asphalt kiln
- Other kiln (specify)
- Blast furnace
- Sulfur recovery furnace
- Smelting, melting, or refining furnace
- Coke oven
- Other furnace (specify)
- Industrial boiler
- Utility boiler
- Process heater
- Other reuse as fuel (specify).

The computer data set used to consolidate and analyze capacity data from Questionnaires B and C included the following information (brief explanation of each data element):

1. Facility ID - The USEPA identification number for the facility

2. Facility Name

3. Unit No. - data were gathered on a unit basis since some facilities have more than one incinerator or kiln

4. Commercial status - the two commercial categories are facilities that (1) accept waste from the general public (full commercial) and (2) accept waste from a limited number of facilities not under the same ownership (limited commercial); the two noncommercial categories are facilities that (3) accept waste from facilities under the same ownership (captive) and (4) manage wastes generated onsite (onsite)

5. Unit type - a code for the type of incinerator or reuse as fuel unit (as described earlier)

6. Fixed or Mobile unit (F/M)

7. Exempt (Y/N) - RCRA permit status

8. Thermal Rating, MBtu/hr

9. Waste Feed Mix (Y/N)

   A. liquids
   B. sludges
   C. solids
   D. gases

10. Unique (Y/N): If yes, explain.

11. Capacity 1986

    A. Hazardous Waste Quantity - this amount represents the quantity of RCRA hazardous waste treated in the subject unit during calendar year 1986. This quantity is also referred to as utilized capacity.

    B. Nonhazardous Waste Quantity - this is the quantity of nonhazardous waste that was treated in the same unit, either concurrently or separately, during 1986.

    C. Hazardous Waste Maximum Quantity (Capacity) - the maximum quantity of hazardous waste that the treatment unit could have treated during 1986.

    D. All Waste Maximum Quantity (Capacity) - the maximum quantity of both hazardous and nonhazardous waste that could have been treated in 1986.

12. Planned changes or new units, by time period, for 1987 through 1992.

The above data were used to tabulate and develop the combustion capacity data set, the results of which will be discussed in Section 4.2.3, Development of the Treatment Capacity Data Set and Results.

The data were compiled in a computer data base for more convenient data management. A copy of the data sheets, along with a description of their use, can be found in the Procedures for Completing PC Data Sheets for Priority TSDR Facilities.[7]

To make the necessary comparisons for this analysis, the original facility responses were converted to one standard unit, volume in gallons. Data reported in short tons (2,000 lb/ton) by facilities were consistently converted to gallons by using a conversion factor of 240 gal/ton (based on the density of water) for all waste forms other than gases. Gases are reported in standard cubic feet (SCF) in the initial data and were converted to tons by assuming an average molecular weight of 29. However, the analyses were done in the appropriate units (e.g., tons for solids) and simply converted to gallons for consistent presentation of units.

Data through 1992 are presented because the long-range plans of many facilities extend to these years, and projections of future capacity may be necessary for variance determinations. It is also assumed that the units reported as operational in 1986 with no closure dates reported will continue to operate through 1992.

4.2.2 Determination of Other Treatment System Capacities

The capacity data set also includes data on treatment systems other than combustion that may be able to treat Third Third proposed wastes to their respective treatment standards. These technologies include solidification/ stabilization and wastewater treatment processes. Because the TSDR Survey and other data for these treatment processes are reported on a unit process basis, a method was developed to derive a system capacity from the unit process data. The results of this analysis were aggregated into a hazardous waste treatment system capacity data set for comparison with required capacity.

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[7] Versar. 1988. Procedures For Completing PC Data Sheets For Priority TSDR Facilities. Prepared for the Office of Solid Waste. Washington, D.C.: U.S. Environmental Protection Agency.

For this proposed rule, capacity data from only fully commercial treatment facilities were used to determine available capacity. These data represent the most readily available capacity, on a national level, to treat the waste that is currently being considered under the land disposal restrictions rule. The capacity indicated by the commercial data set does not include information on two other potential categories of waste treatment capacity, limited commercial and captive facility capacity. "Limited commercial" facilities are those that accept wastes from only a limited number of facilities not under the same ownership--in many cases, only from their customers and/or clients. "Captive facilities" are those that manage wastes from other facilities under the same ownership. Data are not yet available to include in this analysis. However, the Agency does not believe that available capacity from these sources would have affected any of the variance decisions for this rule.

(1) Unit Process Capacity

The TSDR Survey requested capacity data on a process-specific basis. A process is defined in the TSDR Survey as one or more units of equipment acting together to perform a single operation on a waste stream. A system is defined in the TSDR Survey as one or more processes that work together to treat a waste stream. Figure 4-1 presents the process codes provided for the TSDR Survey respondent to report treatment process information.

During technical review, three different interpretations by respondents of the process capacity questions were identified, which determined the method of system capacity analysis to be used by the reviewer.

Case I: Each unit process was reported separately. In such a case, process units must be aggregated into treatment systems so that the capacity of the systems can be calculated from the reported maximum and utilized process capacities.

Case II: The capacity for each process type was combined and reported as one process by the facility, including when the same process was conducted in several different units (tanks or surface impoundments) found in different systems. Responses to the tank and/or surface impoundment questionnaires were used to obtain the utilized capacity of each tank and/or

Figure 4-1

PROCESS CODES

These process codes were developed specifically for this survey to describe the onsite hazardous waste management operations at a facility.

TREATMENT AND RECYCLING

Incineration/thermal treatment

1I	Liquid injection
2I	Rotary (or rocking) kiln
3I	Rotary kiln with a liquid injection unit
4I	Two stage
5I	Fixed hearth
6I	Multiple hearth
7I	Fluidized bed
8I	Infra-red
9I	Fume/vapor
10I	Pyroltic destructor
11I	Other incineration/thermal treatment

Reuse as fuel

1RF	Cement kiln
2RF	Aggregate kiln
3RF	Asphalt kiln
4RF	Other kiln
5RF	Blast furnace
6RF	Sulfur recovery furnace
7RF	Smelting, melting, or refining furnace
8RF	Coke oven
9RF	Other industrial furnace
10RF	Industrial boiler
11RF	Utility boiler
12RF	Process heater
13RF	Other reuse as fuel unit

Fuel blending

1FB	Fuel blending

Solidification

1S	Cement or cements/silicate processes
2S	Pozzolanic processes
3S	Asphaltic processes
4S	Thermoplastic techniques
5S	Organic polymer techniques
6S	Jacketing (macro-encapsulation)
7S	Other solidification

Recovery of solvents and liquid organics for reuse

1SR	Fractionation
2SR	Batch still distillation
3SR	Solvent extraction
4SR	Thin-film evaporation
5SR	Filtration
6SR	Phase separation
7SR	Dessication
8SR	Other solvent recovery (including pretreatment)

Recovery of metals for reuse

1MR	Electrolytic
2MR	Ion exchange
3MR	Reverse osmosis
4MR	Solvent extraction
5MR	Secondary smelting
6MR	Liming
7MR	Evaporation
8MR	Filtration
9MR	Sodium borohydride
10MR	Other metals recovery (including pretreatment)

Wastewater treatment

Equalization

1WT	Equalization

Cyanide oxidation

2WT	Alkaline Chlorination
3WT	Ozone
4WT	Electrochemical
5WT	Other cyanide oxidation

General oxidation (including disinfection)

6WT	Chlorination
7WT	Ozonation
8WT	UV radiation
9WT	Other general oxidation

Chemical precipitation

10WT	Lime
11WT	Sodium hydroxide
12WT	Soda ash
13WT	Sulfide
14WT	Other chemical precipitation

Chromium reduction

15WT	Sodium bisulfite
16WT	Sulfur dioxide
17WT	Ferrous sulfate
18WT	Other chromium reduction

Complexed metals treatment (other than chemical precipiation by pH adjustment)

19WT	Complexed metals treatment

Emulsion beraking

20WT	Thermal
21WT	Chemical
22WT	Other emulsion breaking

Adsorption

23WT	Carbon adsorption
24WT	Ion exchange
25WT	Resin adsorption
26WT	Other adsorption

Stripping

27WT	Air stripping
28WT	Steam stripping
29WT	Other adsorption

Evaporation

30WT	Thermal
31WT	Solar
32WT	Vapor recompression
33WT	Other evaporation

Filtration

34WT	Diatomaceious earth
35WT	Sand
36WT	Multimedia
37WT	Other filtration

Sludge dewatering

38WT	Gravity thickening
39WT	Vacuum filtration
40WT	Pressure filtration (belt, plate and frame, or leaf)
41WT	Centrifuge
42WT	Other sludge dewatering

Air flotation

43WT	Dissolved air flotation
44WT	Partial aeration
45WT	Air dispersion
46WT	Other air flotation

Oil skimming

47WT	Gravity separation
48WT	Colescing plate separation
49WT	Other oil skimming

Other liquid phase separation

50WT	Decanting
51WT	Other liquid phase separation

Biological treatment

52WT	Activated sludge
53WT	Fixed film-trickling filter
54WT	Fixed film-rotating contactor
55WT	Lagoon or basin, aerated
56WT	Lagoon, facultative
57WT	Anaerobic
58WT	Other biological treatment

Other wastewater treatment

59WT	Wet air oxidation
60WT	Neutralization
61WT	Nitrification
62WT	Denitrification
63WT	Flocculation and/or coagulation
64WT	Setting (clarification)
65WT	Reverse osmosis
66WT	Other wastewater treatment

OTHER PROCESSES (TREATMENT OR RECOVERY)

1TR	Other treatment
2TR	Other recovery for reuse

ACCUMULATION

1A	Containers
2A	Tanks

STORAGE

1ST	Container (i.e., barrel, drum)
2ST	Tank
3ST	Waste piles
4ST	Surface impoundment
5ST	Other storage

DISPOSAL

1D	Landfill
2D	land treatment
3D	Surface impoundment (to be closed as a landfill)
4D	Underground injection well

surface impoundment using the process of concern. The maximum capacity of these tanks and/or surface impoundments was obtained by facility contact. The unit process data were then aggregated into treatment systems as in Case I.

Case III: The survey respondent reported the entire treatment system as one process. The utilized and maximum capacities reported for the process were used to represent the entire system. If the individual unit processes that make up the treatment system could not be identified by examining the facility schematic and responses to other questions in the survey, the facility was contacted to obtain that information. The respondent's system data were then inputted into the capacity data set.

Upon completion of technical review, the following information was obtained and examined prior to use in the system capacity analysis:

- All processes that compose the system and the units in which they occur were identified, and a flow diagram was constructed.
- The amount of hazardous and nonhazardous waste that enters and leaves the system was quantified so that a mass balance around the system could be conducted.
- The utilized and maximum capacities of each unit were determined.
- If surface impoundments were used in the treatment system, it was determined whether they met minimum technological requirements. The effect of closing, retrofitting, or replacing the surface impoundment with a tank or new minimum technological surface impoundment on system capacity was determined.
- Also noted were any other planned changes to the system and how they might affect the maximum capacity of the unit and/or system.

(2) Hazardous Waste Treatment/Recovery System Identification

Using the facility schematics, with revisions made as a result of technical review, hazardous waste treatment/recovery systems and their respective unit processes were identified. For purposes of the capacity analysis, a hazardous waste treatment/recovery system was identified by each hazardous waste entry point into a unit process or sequence of unit processes. The system begins at the process unit where the hazardous waste stream(s) first enters and consists of all other treatment or recovery process units downstream from the point of entry.

The following examples demonstrate system identification. Figure 4-2 shows a simple hazardous wastewater treatment system. Hazardous waste can enter the three-unit processes for treatment at only one point, the chemical precipitation process. Therefore, there is only one hazardous waste treatment system. The system consists of chemical precipitation, clarification/ settling, and sludge dewatering (filter press) processes. Note that by this method, recycle streams and nonhazardous waste streams do not affect system identification.

Figure 4-3 depicts three hazardous waste treatment systems. Three hazardous waste entry points exist at three different units, which perform three different processes. The chromium waste treatment system consists of chromium reduction, chemical precipitation of chromium, settling, and sludge dewatering processes. The cyanide waste treatment system consists of a cyanide oxidation process followed by chemical precipitation of metals, and settling and dewatering of the resultant treatment sludge. The third is a treatment system for a general metal-containing waste consisting of chemical precipitation of metals, settling, and sludge dewatering. Note that the three systems share some of the same unit processes. These three systems may be linked together by competing for the capacity of the shared units. If the system capacity determination reveals that at least one of the shared units limits the capacity of at least one of the treatment systems, then the three systems are considered linked systems.

At first glance, Figure 4-4 appears to show two systems because there are two hazardous waste entry points. Upon closer examination, it can be seen that the two waste streams feed into two different tanks that conduct the same process in parallel. For purposes of capacity analysis, these two units are considered one process, with the utilized and maximum capacities of the

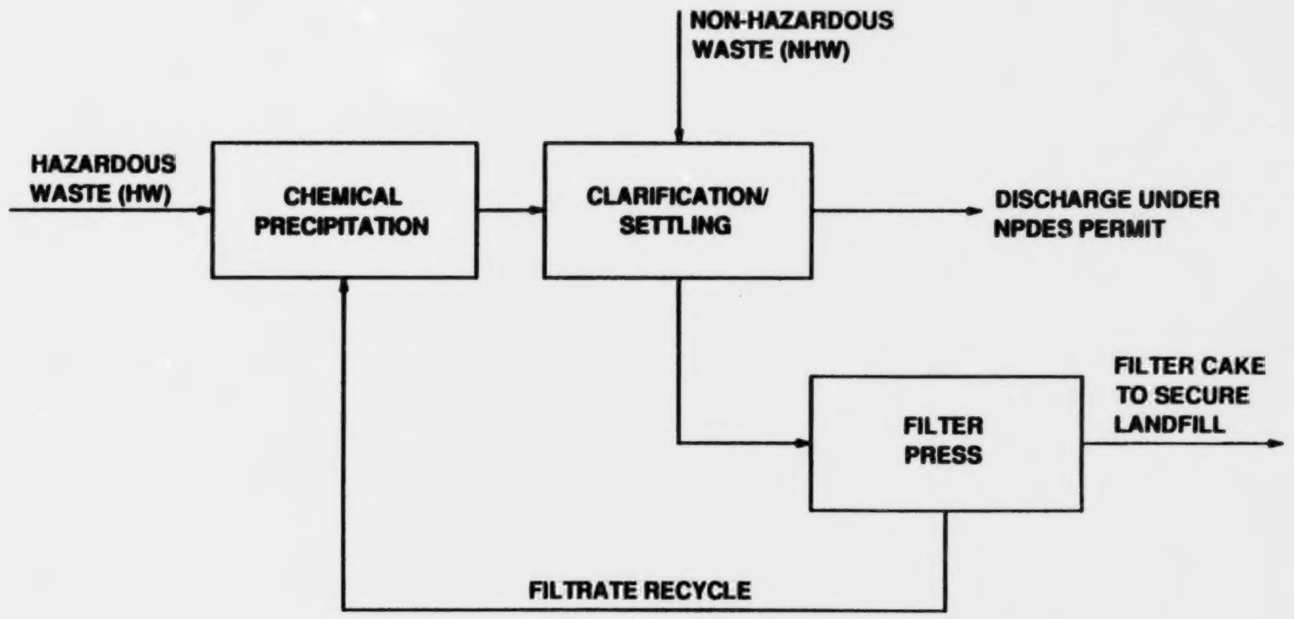
NON-HAZARDOUS
WASTE (NHW)
HAZARDOUS
WASTE (HW)
CHEMICAL
PRECIPITATION
CLARIFICATION/
SETTLING
DISCHARGE UNDER
NPDES PERMIT
FILTER CAKE
TO SECURE
LANDFILL
FILTER
PRESS
FILTRATE RECYCLE

FIGURE 4-2. FLOW DIAGRAM OF A SIMPLE SYSTEM

F9O156 1

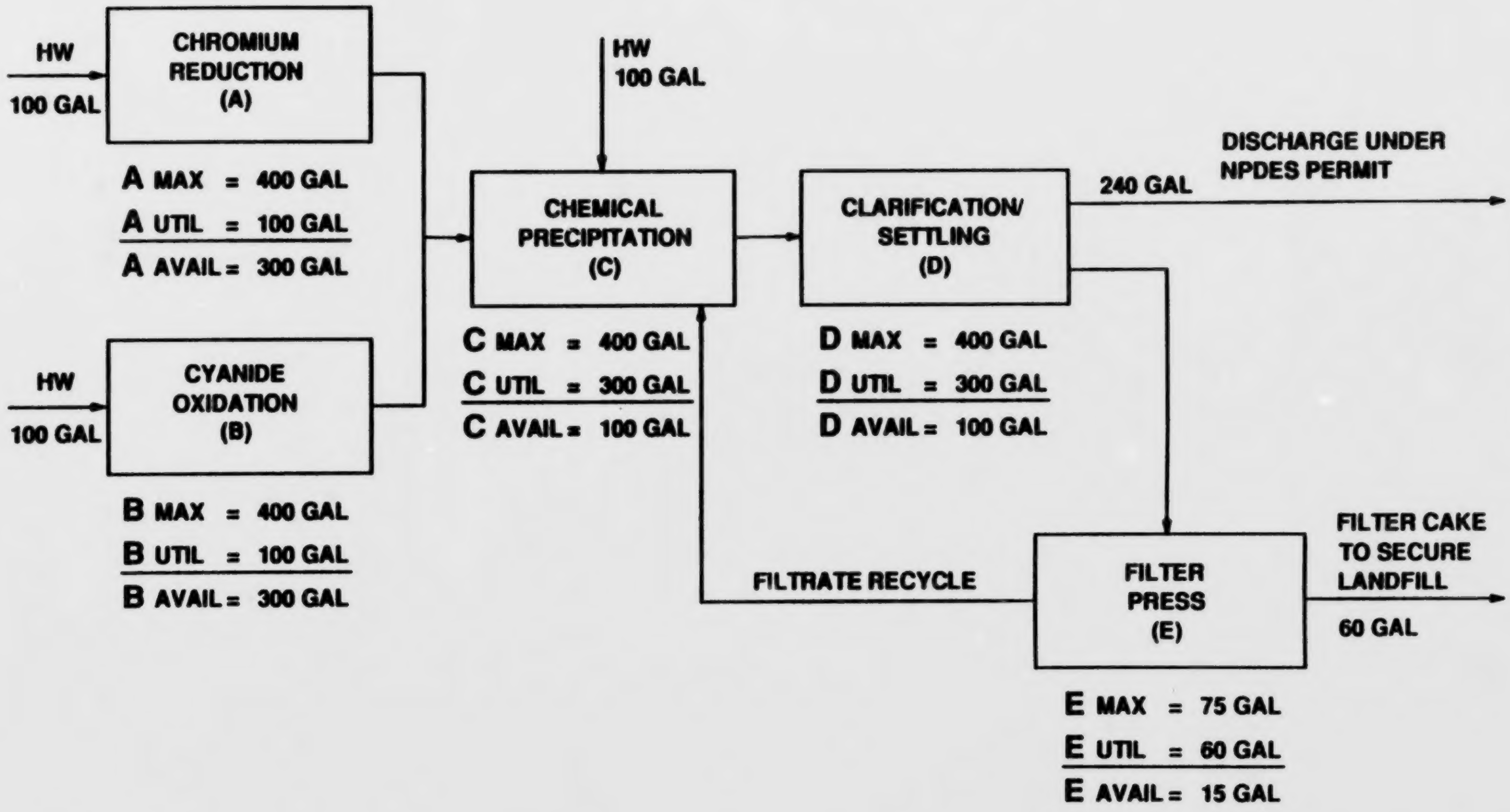
HW
100 GAL
CHROMIUM REDUCTION (A)
A MAX = 400 GAL
A UTIL = 100 GAL
A AVAIL = 300 GAL
HW
100 GAL
CYANIDE OXIDATION (B)
B MAX = 400 GAL
B UTIL = 100 GAL
B AVAIL = 300 GAL
HW
100 GAL
CHEMICAL PRECIPITATION (C)
C MAX = 400 GAL
C UTIL = 300 GAL
C AVAIL = 100 GAL
CLARIFICATION/ SETTLING (D)
D MAX = 400 GAL
D UTIL = 300 GAL
D AVAIL = 100 GAL
240 GAL
DISCHARGE UNDER NPDES PERMIT
FILTRATE RECYCLE
FILTER PRESS (E)
E MAX = 75 GAL
E UTIL = 60 GAL
E AVAIL = 15 GAL
FILTER CAKE TO SECURE LANDFILL
60 GAL

FIGURE 4-3. FLOW DIAGRAM OF THREE SYSTEMS WITH UNIT PROCESS CAPACITIES

F90156 2

"aggregated unit" equal to the sum of the utilized and maximum capacities of each of the individual units. Therefore, Figure 4-4 depicts only one hazardous waste treatment system.

(3) Determination of System Capacity

To determine the capacity of a treatment system, the utilized and maximum capacity of each unit process must be examined. Where several systems share unit processes, such as in Figure 4-3, all the unit processes that make up each of the potentially linked systems must be considered together for this portion of the analysis.

The capacity determination takes a "snapshot" approach, treating batch and continuous processes similarly by conducting a mass balance based on the amount of waste that was treated and could be treated during the entire year. Survey respondents reported unit capacities as the amount of hazardous waste entering the unit in 1986, the amount of nonhazardous waste entering the unit in 1986, the hazardous waste maximum capacity, and all waste maximum capacity. Volumes from internal recycle streams are considered in the volumes respondents reported for utilized and maximum unit capacities; therefore, recycle streams are not considered separately when conducting systems analysis.

The available capacity for each unit was calculated by subtracting the utilized capacity from the maximum capacity. The available capacities of upstream units were compared with each unit in the process string to locate the limiting unit(s) in the system(s). The overall system capacity was based on the restrictions imposed by the limiting unit.

The above methodology assumes a 1986 baseline for hazardous and nonhazardous wastes already being treated in the system and uses only that portion of the system's remaining capacity that the respondent claims may be used for hazardous waste treatment. It was assumed that when a survey respondent reported hazardous waste maximum capacity to be less than all waste maximum capacity, the respondent had already considered how much nonhazardous

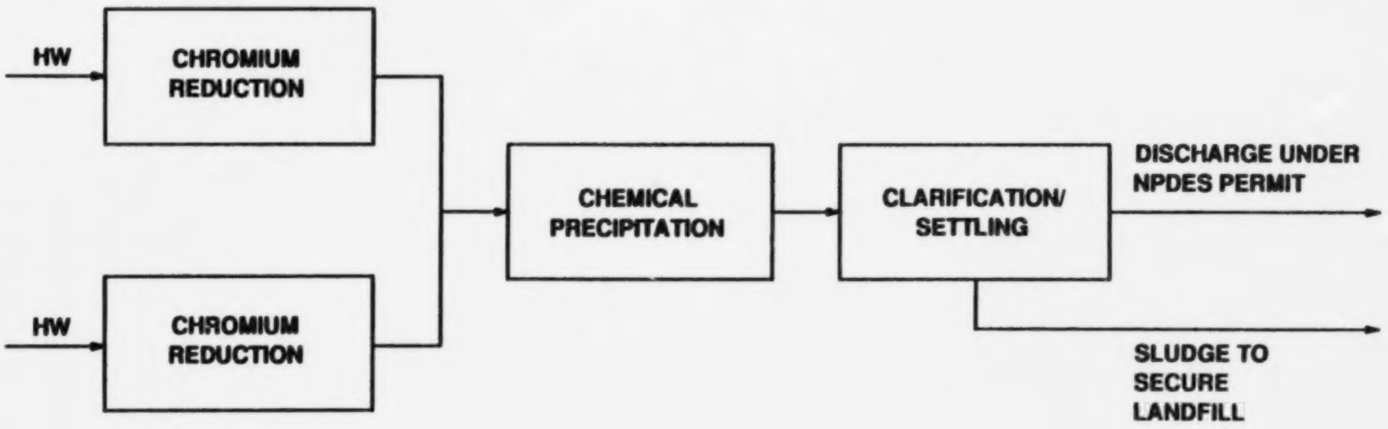
HW
CHROMIUM REDUCTION
HW
CHROMIUM REDUCTION
CHEMICAL PRECIPITATION
CLARIFICATION/ SETTLING
DISCHARGE UNDER NPDES PERMIT
SLUDGE TO SECURE LANDFILL

FIGURE 4-4. FLOW DIAGRAM OF ONE SYSTEM WITH TWO UNITS CONDUCTING THE SAME PROCESS

F90158 3

waste would be treated using the system when reporting the hazardous waste maximum capacity for the unit.

The available capacity of a simple system is the available capacity of the limiting unit. In Figure 4-5, B is the limiting unit because it has the smallest available capacity. If one were to try to treat 50 gallons of additional hazardous waste using this system, there would be a bottleneck at unit process B because it has room for only 25 additional gallons of waste. Therefore, the system has only 25 gallons of available hazardous waste treatment capacity. The maximum hazardous waste treatment system capacity would be 75 gallons--50 gallons of hazardous waste capacity already utilized plus the additional 25 gallons of available capacity based on limiting unit B.

When more complicated systems are analyzed, care must be taken that the total available capacities affecting a downstream unit are considered. Referring to the unit capacities provided in Figure 4-3, if the amount of waste being treated in units A and B were increased by 300 gallons in each unit (i.e., if they were run at their maximum capacities), unit C would become a bottleneck because it has only 100 gallons of available capacity. In other words, when units directly upstream of the unit of concern are in parallel, one must add the available capacities of the upstream units before comparing them with the available capacity of the unit of concern to determine whether that unit limits (imposes a restriction on) the maximum capacity of the upstream units (Example: $A_{Avail} + B_{Avail} = 600$ gal and 600 gal $> C_{Avail}$).

The effective available capacity of an upstream unit must be calculated for comparison with the downstream unit's available capacity in cases where only a portion of the waste treated in the upstream unit is treated in the downstream unit of concern. If one refers to Figure 4-3, one must consider the effluent stream from the clarifier being discharged under an NPDES permit when determining the effect of using the available capacity of the clarifier on the available capacity of the filter press. That fraction of waste being treated in the upstream unit that continues to the downstream unit is calculated. Under the assumption that as the utilized capacities of these

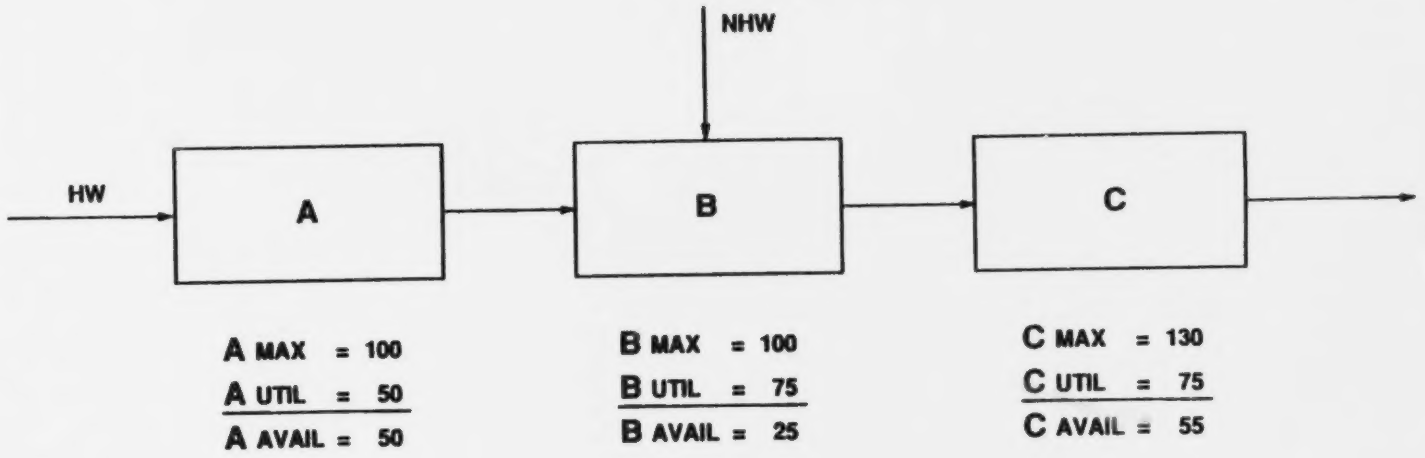
HW
A
B
C
NHW
A MAX = 100
A UTIL = 50
A AVAIL = 50
B MAX = 100
B UTIL = 75
B AVAIL = 25
C MAX = 130
C UTIL = 75
C AVAIL = 55

FIGURE 4-5. FLOW DIAGRAM WITH UNIT CAPACITIES

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units are increased, the percent of waste that is treated in both upstream and downstream units remains constant, the calculated percent is applied to the reported available capacity of the upstream unit before that capacity is compared with the available capacity of the downstream unit.

In Figure 4-3, the fraction of waste (D_p) going from the clarifier to the filter press (unit E) is calculated by:

$$D_p = \frac{E_{util}}{D_{util}} = \frac{60}{300} = 0.2.$$

Twenty percent of the waste treated by unit D is treated by unit E. Now the available capacity of the clarifier affecting the filter press (D_{eal}) is calculated:

$$D_{eal} = (D_p)\ (D_{avail}) = (0.2)\ (100) = 20 \text{ gallons}.$$

If the amount of waste being treated in the clarifier is increased to its maximum capacity, then 20 more gallons of waste will flow to the filter press. A comparison of the effective available capacities, however, indicates that the filter press limits the maximum capacity reported for the clarifier:

$$E_{avail} < D_{eal} \text{ or } 15 \text{ gallons} < 20 \text{ gallons}.$$

Considering the fact that the filter press limits the maximum capacity of the clarifier, the "new" available capacity of the clarifier must be compared to the capacity of the upstream unit, the chemical precipitation unit. The limiting effect of the filter press on the available capacity of the clarifier (D_{nac}) is quantified as follows:

$$D_{nac} = \frac{E_{avail}}{D_p} = \frac{15}{0.2} = 75 \text{ gallons}.$$

Based on the comparison of the "new" available capacity of the clarifier with the upstream chemical precipitation unit and the earlier comparison made between the chemical precipitation unit and the parallel upstream units, the filter press limits the capacities of all the other units in the process string.

At this point, the capacity analysis switches from a unit-by-unit analysis to a systems analysis. The effect of the limiting unit on the system's available and maximum capacity is determined. As previously discussed, Figure 4-3 shows three hazardous waste treatment systems. The utilized capacity of each of these systems is the amount of waste that enters each system for treatment. The utilized capacities for the chromium waste treatment, cyanide waste treatment, and metals waste treatment are 100 gallons each. The available capacity of each system, as determined by the effect of the limiting unit, is 75 gallons. This quantity, which was derived above, reflects the effluent stream that exits the systems upstream from the limiting filter press. The maximum capacity of each system equals the utilized capacity of the system plus the available capacity of the system. The maximum capacities of the chromium waste, cyanide waste, and metals waste treatment systems equal 175 gallons each.

When waste treatment systems share a limiting unit, as shown by the three systems in Figure 4-3, they compete for the available capacity of that limiting unit. Because of this competition for limited capacity, these linked systems cannot all operate at their maximum capacities, as calculated above. A linked system can operate at its maximum capacity only if all the other systems to which it is linked continue to operate at the utilized capacities reported for 1986. The maximum capacities of each of the linked systems serve as end points when sufficient capacity for waste volumes requiring treatment is sought. Using the example shown in Figure 4-3 to illustrate, if additional chromium waste is sent to the chromium treatment system, then there is that much less additional capacity for cyanide waste and metals waste treatment. If the chromium waste treatment system operates at maximum capacity, then no additional waste may be sent to the cyanide waste treatment system or the metals waste treatment system.

To avoid overestimating available treatment capacity, a proportioned system capacity is calculated for linked systems. The proportioned system capacity is based on how much of the limiting unit's capacity was devoted to each linked system during the TSDR Survey base year of 1986. First, the fractional flow of hazardous waste contributed by each linked system to the limiting process is determined. Using the systems shown in Figure 4-3:

Fractional flow of chrome treatment system = CR_p

Fractional flow of cyanide treatment system = CN_p

Fractional flow of metals treatment system = M_p

$$CR_p = \frac{CR_{util}}{CR_{util} + CN_{util} + M_{util}} = \frac{100}{100 + 100 + 100} = \frac{100}{300} = 0.333$$

$$CN_p = 0.333; \; M_p = 0.333.$$

Note that M_{util} is the utilized capacity of the metals treatment system, not the utilized capacity of the chemical precipitation unit. The utilized capacity of the chemical precipitation unit is the sum total of the utilized capacities of all three systems.

The effect of the limiting unit on each available system capacity is proportioned to each system based on the fractional flow determination. Continuing the calculation to determine the proportioned available capacity (CR_{pac}) using the above example:

$$CR_{pac} = (CR_p)\,(D_{nac}) = (0.333)\,(75) = 25 \text{ gallons}$$

$$CN_{pac} = (CN_p)\,(D_{nac}) = 25 \text{ gallons}$$

$$M_{pac} = (M_p)\,(D_{nac}) = 25 \text{ gallons.}$$

Note that D_{nac}, the previously calculated "new" available capacity of unit D, reflects the effect of the limiting unit on all three systems and accounts for the effluent stream that exits the system before reaching the limiting unit.

When a linked system has an unshared limiting unit upstream from the mutually shared limiting unit of the other linked system(s), the system's calculated proportioned available system capacity must be compared with the available capacity of its limiting unit. If the limiting unit's available capacity is less than the calculated proportioned available system capacity, the final proportioned available system capacity equals the available capacity of the unshared limiting unit. The remainder of the calculated proportioned available system capacity is redistributed to the remaining linked systems based on how extensively the mutually shared limiting unit is devoted to the remaining linked systems. In the example shown in Figure 4-3, the limiting unit for all three systems is the shared filter press; therefore, no comparisons are necessary.

The proportioned maximum system capacity equals the utilized system capacity plus the proportioned available system capacity. The proportioned maximum system capacities (PMC) for the systems displayed in Figure 4-3 are:

$$CR_{PMC} = CR_{util} + CR_{pac} = 100 + 25 = 125 \text{ gallons}$$

$$CN_{PMC} = 125 \text{ gallons}$$

$$M_{PMC} = 125 \text{ gallons.}$$

(4) Projections of Available Capacity

The TSDR Survey requested capacity data for the baseline year 1986 and for changes or new operations planned through 1992. Projections of capacity beyond 1986 were obtained from the data by engineering analysis of information regarding new treatment/recovery systems being installed and equipment changes being made to the systems operating in 1986 that result in changes in system capacity.

For new systems, capacity analyses were conducted as described above and the results were input into the treatment system data set for the appropriate years. Reported equipment changes to treatment systems operating in 1986 were examined to determine their effect on the system capacity. If the change involved the system's limiting unit or influenced the effect of a limiting unit on the system, then capacity analyses were performed again, incorporating the capacity changes for that year.

4.2.3 Development of the Treatment Capacity Data Set and Results

The treatment/recovery capacity data set consists of an incineration/ reuse as fuel data set and other treatment systems data set. System capacity data derived from data reported in the TSDR Survey, as described above, were entered onto data entry sheets. The purpose of these forms was to standardize information required for assessing available treatment capacity that was to be obtained from the TSDR Survey and entered into a computer data set. The data set is described in a report that can be found in the docket for this proposed rule.[8] A detailed discussion of the data entry sheets can also be found in the RCRA docket for this final rule.[9]

The following discussion presents the results of the incineration/ reuse-as-fuel data set.

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[8] Versar. 1989. The commercial treatment/recovery TSDR survey data set. Prepared for the Office of Solid Waste. Washington, D.C.: U.S. Environmental Protection Agency.

[9] Versar. 1988. Technical Review Procedures for Completing PC data sheets for priority TSDR facilities. Prepared for the Office of Solid Waste. Washington, D.C.: U.S. Environmental Protection Agency.

(1) Incineration/Reuse-as-Fuel Data Set Results

Table 4-1 summarizes the commercial capacity for hazardous waste incineration. This table presents the utilized, maximum, and available capacity for incineration of liquids, sludges, solids, and gases in 1986, and maximum and available capacity for 1987, 1988, 1989, and 1990-1992. For this table, it is assumed that hazardous waste capacity not utilized in 1986, as well as all new hazardous waste capacity from 1987 and beyond, will be available for incineration of hazardous wastes, and the impact of previous land disposal restrictions on available capacity is not considered.

For commercial incinerators of sludges and solids, EPA determined whether facilities reporting planned capacity additions in 1989/90 had become operational. Of all such facilities, only Alchem-Tron in Cleveland, Ohio, verified operations in 1989. The available capacity for this facility was therefore included in the total 1989 available capacity reported in Table 4-1. All other additional commercial incineration capacity reportedly planned for 1989/90 was included in the planned 1990-1992 capacity, leaving only verified available capacity at currently operating facilities in the 1989 total.

Table 4-2 summarizes the commercial capacity for reusing hazardous wastes as fuel. The table presents the utilized, maximum, and available capacity for combustion of liquids, sludges, and solids as fuel in 1986, and maximum and available capacity for 1987, 1988, 1989-1990, and 1991-1992. Again, it is assumed that hazardous waste capacity not utilized in 1986, and all new hazardous waste capacity from 1987 and beyond, will be available for combustion of hazardous wastes, and the impact of previous land disposal restrictions on available capacity is not considered.

For commercial facilities reportedly reusing hazardous sludges and solids as fuel, EPA determined that none of the facilities reporting planned capacity additions in 1989/90 would be operational in 1989. Due to the large number of facilities reportedly reusing hazardous liquids as fuel, and the excess available capacity to handle the alternative treatment of land-disposed wastes, EPA did not include the 1989/90 planned additions to capacity in the

Table 4-1 Summary of Commercial Hazardous Waste Incineration Capacity (Million Gallons/Year)[a]

Physical form of waste	1986			1987		1988		1989		1990-1992	
	Utilized capacity	Maximum capacity	Available capacity	Maximum capacity	Available capacity[b]	Maximum capacity	Available capacity[b]	Maximum capacity	Available capacity[b]	Maximum capacity	Available capacity[b]
Liquids	63	80	17	101	38	113	51	113	51	169	106
Sludges	3	8	5	8	5	11	8	11	8	79	73
Solids	17	27	10	27	10	36	19	36	19	194	117
Gases	0	2	2	2	2	3	3	3	3	3	3
TOTAL	83	117	34	138	55	163	81	163	81	445	299

Source: Current capacity data set.

[a] Due to updated information, utilized, maximum, and available capacity numbers have been revised since the Second Third final rule.

[b] Projected based on maximum capacity for that year minus utilized capacity for 1986. This considers that capacity not utilized in 1986 and all new capacity (from 1987 and beyond) will be available for incineration of hazardous wastes being land disposed that may be affected by the land disposal restrictions.

Table 4-2 Summary of Commercial Capacity for Reuse of Hazardous Waste as Fuel (Million Gallons/Year)[a]

	1986			1987		1988		1989		1990-1992	
Physical form of waste	Utilized capacity	Maximum capacity	Available capacity	Maximum capacity	Available capacity[a]	Maximum capacity	Available capacity[b]	Maximum capacity	Available capacity[b]	Maximum capacity	Available capacity[b]
Liquids	99	371	272	398	298	388	289	388	289	615	516
Sludges	<1	5	5	6	6	11	11	11	11	42	42
Solids	<1	1	1	1	1	6	6	6	6	1	1
	—	—	—	—	—	—	—	—	—	—	—
TOTAL	99	377	278	405	305	405	306	405	306	658	559

Source: Current capacity data set.

NOTE: For cases where capacity was added to existing units or new units were added, all facilities indicated that new capacity would be available 100 percent for hazardous waste.

[a] Due to updated information, utilized, maximum, and available capacity numbers have been revised since the Second Third final rule.

[b] Projected based on maximum capacity for that year minus utilized capacity for 1986. This considers that capacity not utilized in 1986 and all new capacity (from 1987 and beyond) will be available for burning (reuse as fuel) of hazardous wastes being land disposed that may be affected by the land disposal restrictions: does not consider the impact of previous land disposal restrictions on available capacity.

total 1989 available capacity. All additional to commercial capacity for reuse as fuel reportedly planned for 1989/90 are included in the planned 1990-1992 capacity total.

(2) Development of the Data set for Other Treatment Systems

Data entry sheets were filled out for other treatment systems, and the data were entered into a computer data set. The data set contains data entry fields as well as calculated fields used to perform the capacity analysis. A more detailed explanation of the data fields contained in the data set can be found in a report in the RCRA docket for this rule.[10]

The data set has four major treatment system categories, each of which is divided into subcategories. A more detailed discussion of how and why the categories were developed is given below. The categories and subcategories, along with the codes used to represent them within the data set, are listed as follows:

I. Wastewater Treatment

Process	Code
- Cyanide Oxidation	WW, CO
- Chrome Reduction	WW, CR
- Organics/Metals Treatment	WW, OMT
- Organics/Metals Biological Treatment	WW, OMB
- Sulfide Precipitation	WW, SP
- General Chemical Precipitation	WW, GCP
- Steam Stripping	WW, SS
- Air Stripping	WW, AS
- Biological Treatment	WW, BT
- Carbon Adsorption	WW, CA

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[10] Versar. 1988. Technical Review Procedures For Completing PC Data Sheets For Priority TSDR Facilities. Prepared for the Office of Solid Waste. Washington, D.C.: U.S. Environmental Protection Agency.

- General Oxidation	WW, GO
- Wet-Air Oxidation	WW, WAO
- Neutralization	WW, N

II. Solvent Recovery

Process	Code
- Thin Film Evaporation	SR, TF
- Fractionation/Distillation	SR, FD
- Solvent Extraction	SR, SE
- Other Solvent Recovery	SR, O

III. Metals Recovery

Process	Code
- High Temperature Metals Recovery	MR, HT
- Retorting	MR, R
- Secondary Smelting	MR, SS
- Other Metals Recovery	MR, OMR

IV. Solidification

Process	Code
- Solidification	SL, S

The maximum, utilized, and available capacities were totaled for all systems in the data base that fell under each category. Each category is mutually exclusive so that the capacity of a treatment system is not double-counted. The treatment systems were categorized by using the computer to search each record for key unit types (process codes) that would identify the appropriate category under which the system should be placed. For example, records indicating systems with unit types identified by process codes 2WT, 3WT, 4WT, or 5WT, and 10WT through 15WT were categorized under cyanide oxidation. These categories are used because the BDAT program has identified them as treatment methods that may be effective in attaining the treatment standards established under the solvents and dioxins, California list, First Third, Second Third rulemakings, and the Third Third proposed rule.

(3) Treatment Capacity Data Set Results

Only a subset of the treatment systems that compose the treatment capacity data set was required by the Second Third promulgated wastes. These treatment categories have been identified under the BDAT program as being effective in attaining the applicable treatment standards. Under each category, only commercial treatment systems were aggregated to establish a national supply of available treatment capacity that can be used to meet the demand created by the Land Disposal Restriction Rules.

Table 4-3 presents the maximum, utilized, and available capacities of commercial treatment systems (other than combustion) of concern for the baseline year 1986 and capacity projections through 1992. When making these projections, the 1986 utilized capacities of these treatment systems were assumed to remain constant for the subsequent years. Where a linked system exists, the proportioned system capacity for the linked system is used to avoid overestimating available capacity. For commercial treatment systems that closed between 1986 and 1988 or will close in 1989 or 1990, the utilized capacity of that system remained in the analysis under the assumption that the waste volumes the system was treating will require commercial capacity elsewhere. Keeping the utilized capacity of the closed system in the analysis results in reducing the available commercial capacity for that category. The data in this table were summarized from a report on commercial treatment capacity.[11]

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[11] Versar. 1989. The Commercial Treatment/Recovery TSDR Survey Data Set. Prepared for the Office of Solid Waste. Washington, D.C.: U.S. Environmental Protection Agency.

Table 4-3 Summary of Commercial Treatment System Capacities (Million Gallons/Year)[a]

Technology Description	Utilized	1986		1987		1988		1989		1990-1992	
		Maximum capacity	Available capacity	Maximum capacity	Available capacity	Maximum capacity	Available capacity	Maximum capacity	Available capacity	Maximum capacity	Available capacity
Alkaline Chlorination	1	3	2	3	2	3	2	3	2	3	2
Alkaline Chlorination and Chemical Precipitation	16	39	23	39	23	56	40	56	40	67	51
Biological & Carbon Adsorption	31	37	6	37	6	37	6	37	6	37	6
Carbon Adsorption and Chemical Precipitation	9	41	32	41	32	51	41	51	41	82	73
Chemical Oxidation and Chemical Precipitation	43	72	29	72	29	72	29	72	29	72	29
Chemical Precipitation	185	538	353	546	361	546	361	550	364	539	354
Chromium Reduction and Chemical Precipitation	148	275	127	275	127	272	124	272	124	325	177
Mercury Retorting	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Neutralization	25	143	117	143	117	61	36	61	36	182	157
Secondary smelting	49	52	3	71	22	86	37	86	37	98	49
Stabilization	141	615	474	623	482	892	751	892	751	2,192	2,051
Thermal Recovery	0	0	0	0	0	0	0	0	0	0	0

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[a] Numbers may not add exactly because of rounding.

[b] Projected based on maximum capacity for that year minus utilized capacity for 1986. This considers that capacity not utilized in 1986 and all new capacity (from 1987 and beyond) will be available for treatment of hazardous wastes being land disposed that may be affected by the land disposal restrictions; does not consider the impact of previous land disposal restrictions on available capacity.

Table 4-3 Summary of Commercial Treatment System Capacities (Million Gallons/Year)[a]

Technology Description	Utilized	1986		1987		1988		1989		1990-1992	
		Maximum capacity	Available capacity	Maximum capacity	Available capacity	Maximum capacity	Available capacity	Maximum capacity	Available capacity	Maximum capacity	Available capacity
Treatment of Reactives and Chromium Reduction and Chemical Precipitation	1	3	2	3	2	3	2	3	2	3	2
Vitrification	0	0	0	0	0	0	0	0	0	0	0
Wet-Air Oxidation	0	0	0	0	0	<1	<1	<1	<1	18	18
Wet-Air Oxidation and Carbon Adsorption	0	0	0	0	0	<1	<1	<1	<1	<1	<1
Wet-Air Oxidation and Carbon Adsorption and Chemical Precipitation	0	0	0	0	0	<1	<1	<1	<1	<1	<1
Wet-Air Oxidation and Chemical Precipitation	0	0	0	0	0	<1	<1	<1	<1	<1	<1
Wet-Air Oxidation and Reduction	0	0	0	0	0	<1	<1	<1	<1	<1	<1

1989 data included in the available capacity analysis section of the Second Third final rule were based on facility projections made in 1987. For each rule, EPA contacts facilities to verify critical projected capacities reported in the TSDR Survey. Since promulgation of the Second Third final rule, EPA has contacted some facilities that anticipated additional available capacity for 1989. Based on the information provided by facility contacts, EPA has determined that several facilities did not come on-line as early as projected. As a result, 1989 data has been adjusted to reflect this new information. Four of the technologies required for the Third Third proposed rule were affected by this new information. These technologies include: 1) carbon adsorption followed by chemical precipitation, 2) neutralization, 3) secondary smelting, and 4) stabilization. Technologies affected by additional information include chemical precipitation, chromium reduction and chemical precipitation, and wet-air oxidation.

In addition to the available capacity revisions mentioned above, the Agency also made revisions based on a redefinition of two technologies required for the Third Third proposed rule: 1) chemical oxidation followed by chemical precipitation and 2) chemical precipitation. In the Second Third final rule the BDAT treatment for several waste codes specified general chemical oxidation and chromium reduction/chemical precipitation as a required treatment train. As a result, general chemical oxidation and chemical precipitation and general chemical oxidation and chromium reduction/chemical precipitation were analyzed separately. For the Third Third rule however, there are no waste codes that require general chemical oxidation and chromium reduction/chemical precipitation. Therefore the distinction between the two technologies is not necessary for the Third Third proposed rule.

Finally, for chemical precipitation the capacity numbers reported in this rule include the utilized, maximum, and available capacity for both chemical precipitation and sulfide precipitation. For the Second Third rule these technologies were analyzed separately. Because this distinction has no significant impact on the capacity analysis for the Third Third proposed rule, however, the Agency has consolidated chemical precipitation and sulfide precipitation into one category, chemical precipitation.

4.3 Capacity Analysis (Comparison of Required and Available Treatment Capacity)

As previously described, the Agency is responsible for determining whether sufficient capacity exists to meet the requirements of the land disposal restrictions. This involves the comparison of required and available capacity. Available treatment capacity can be categorized by facility status as follows:

- On-site (private capacity) - facilities that manage only waste generated onsite.
- Captive capacity - facilities that manage only waste from other facilities under the same ownership.
- Limited commercial capacity - facilities that manage waste from a limited number of facilities not under the same ownership.
- Commercial capacity - facilities that manage waste from any facility.

The data set contains information on commercial capacity (also limited commercial capacity for reuse as fuel) from baseline year 1986 and information on planned changes to 1986 management methods and new processes to be installed from 1987 through 1992. The methodology for determining the amount of available treatment capacity was described in Section 4.2. Information on captive capacity was not incorporated into the analysis for this proposed rule because the Agency does not believe that this capacity would have affected the variance decisions.

Required capacity consists of wastes previously land disposed that will require treatment to meet a treatment standard prior to being land disposed. These volumes of waste were identified and underwent treatability analysis as was described in Section 4.1. The result of the treatability analysis was the assignment of waste volumes to treatability subgroups.

The comparison of required and available capacity was performed on a facility-by-facility basis. This was done to match treatability subgroups with available capacity of applicable treatment/recovery systems. Available on-site treatment capacity was matched only to volumes that were previously land disposed on-site and were determined to require alternative treatment. If the appropriate treatment/recovery technology was not available on-site, or if adequate available capacity was not present to manage the waste, then the remaining volume of waste requiring alternative treatment was aggregated into a national demand for commercial capacity. The final aggregate of national demand was then compared with the final estimates of national commercial capacity to match treatability subgroups with appropriate treatment technologies. This methodology was used by the Agency to make final determinations concerning variances.

APPENDIX A

MULTI-SOURCE LEACHATE

A.1 INTRODUCTION

The Hazardous and Solid Waste Amendments (HSWA) of 1984 mandated that EPA promulgate regulations restricting the land disposal of hazardous wastes. The land disposal restrictions are effective immediately upon promulgation. However, the Agency can grant a national variance from the statutory date to specific wastes if there is insufficient treatment or recovery capacity available for these wastes. Both the capacity of available treatment or recovery technologies and the quantity of restricted wastes currently sent to land disposal are used to determine whether variances should be granted to multi-source leachate. This analysis is designed to determine whether adequate capacity exists to treat multi-source leachate that will become restricted from land disposal as a result of the Third Third Rule. The analysis focuses on primary data sources to determine the actual volumes of multi-source leachate or residuals from the treatment of multi-source leachate currently going to land disposal and to evaluate whether there is enough available capacity to treat these wastes.

Multi-source leachate is defined as leachate derived from the disposal of more than one listed or characteristic hazardous waste. Leachate from characteristic waste is considered multi-source if it exhibits more than one characteristic. In the Third Third of the land disposal restrictions, such leachate will be prohibited from land disposal. Residues from treating such leachate, as well as residues such as soil and ground water that are contaminated by such leachate, are also subject to land disposal prohibition under this rule. Leachate deriving from a single source must meet the standard developed for the waste code from which it is derived and is therefore not subject to the standards developed for multi-source leachate. In cases where other restricted wastes not initially present in the leachate are mixed with the multi-source leachate, any standards applicable to those other restricted wastes continue to apply.

EPA originally imposed a land disposal ban on multi-source leachate under the First Third of the land disposal restrictions (LDRs). Under the land ban, multi-source leachate would have to be treated to satisfy all the standards applicable to the original wastes from which the leachate is derived (see 53 FR 31146-150 (Aug. 17, 1988)). EPA revisited the issue of multi-source leachate treatability to address concerns raised by the hazardous waste management industry, and rescheduled promulgation of a land disposal ban for multi-source leachate to the Third Third of the LDRs in order to fully study the most appropriate section 3004(m) treatment standards for multi-source leachate (see 54 FR 8264 (January 27, 1989)).

Multi-source leachate is generated primarily at landfills where a variety of wastes have been land disposed and leachate is eventually created. This leachate is derived from multiple sources that may no longer be identified individually. The management of multi-source leachate varies depending on the age of the generating facility, its regulatory status, the physical/chemical composition of the multi-source leachate, the volumes of leachate generated, and the waste treatment processes used at a particular facility. In general, multi-source leachate can be expected to be generated at facilities containing landfills which have received a large number of wastes over time.

The remainder of this Appendix discusses the data bases and the methodology used in this analysis, highlights the major caveats and limitations of the analysis, and presents the results of the capacity analysis of multi-source leachate.

A.2 DATA SOURCES

This section documents the data sources reviewed for the multi-source leachate capacity analysis. These include the TSDR Survey and the TSDR Capacity Data Set, the Generator Survey, data submitted by the hazardous waste management industry, and other data sources. Each are discussed below. We present in the last subsection the data actually used in the analysis.

A.2.1 TSDR Survey and TSDR Capacity Data Set

The TSDR Survey was conducted by EPA in 1986 to collect information on the management practices at hazardous waste treatment, storage, disposal, and recycling (TSDR) facilities. The TSDR Capacity Data Set was created from selected responses to the TSDR Survey. The TSDR Capacity Data Set focuses on the treatment and disposal capacity and on the land disposal volumes of hazardous wastes. The TSDR Capacity Data Set provides data on disposal methods at TSDR facilities, such as landfills and surface impoundments, and the waste volumes associated with each disposal practice at both commercial and non-commercial facilities.

EPA used the following specific information from the TSDR Survey in the capacity analysis for multi-source leachate:

- The quantity of multi-source leachate generated onsite;
- The quantity of multi-source leachate received from offsite;
- The quantity of multi-source leachate placed (i.e., treated, stored, or disposed) in land disposal units (i.e., waste piles, surface impoundments, landfills, land treatment units, and underground injection wells); and
- The commercial status of the facility.

From the TSDR Capacity Data Set, EPA retrieved waste stream data for facilities reporting multi-source leachate from hazardous waste landfills (coded as XLEA) or waste descriptor code B16 (identifying leachate which could be single source or multi-source), as well as other useful data from both commercial and non-commercial facilities. EPA used this information to estimate the quantity of multi-source leachate reported as being generated and land placed.

The Agency also identified all landfills and surface impoundments (including storage, treatment, and disposal surface impoundments) that did not report XLEA or B16 (decriptor code for leachate), because there is a reasonable belief that these facilities may have generated leachate and therefore would require further analysis.

In order to show the flow of waste within facilities that manage hazardous waste, facilities were asked to complete two types of schematics in the TSDR Survey: (1) a general facility-wide schematic or flow diagram showing the hazardous waste management activities and operations the facility has and how they relate to one another; and (2) detailed schematics of the treatment and recycling operations identified in the general facility-wide schematic, showing how individual units operate within the system (such as tanks, surface impoundments, incinerators, and boilers) and how the processes in these systems relate to one another.

The information available from these schematics includes:

- Each treatment or recycling operation available on-site;
- The types of processes used to treat and dispose of the wastes;
- Number of tanks and surface impoundments in which these processes occur;
- The points in the treatment/recycling/disposal operations in which reagents or chemical additives enter a process;
- The points in the operation in which wastes and/or treatment residuals enter or exit a process;
- Whether wastes are rendered non-hazardous;
- The physical form of the waste throughout the processes (e.g., dewatered sludge);
- The types of hazardous wastes entering the facility from off-site and points at which residuals that are not managed on-site are sent off-site.
- The origination of the wastes; and
- The types of systems where discharges are sent.

A.2.2 Generator Survey

The Generator Survey was designed to be used in conjunction with the TSDR Survey. This data base contains information on capacity as well as generated waste streams. All facilities were required to complete Questionnaire GA, "General Facility Information," and Questionnaire GB, "Hazardous Waste Characterization." Facilities that completed the TSDR Survey were only required to submit Questionnaires GA and GB.

From Questionnaire GB, EPA extracted information on Questions 1 through 27. We only requested responses for generators who reported "XLEA" as the RCRA waste code or reported "B16" (leachate) as the waste descriptor code. Responses to Questions 1 through 19 provide information on:

- The sources of leachate generation;
- The quantities of waste generated onsite during 1985 and 1986;
- The quantities of waste disposed onsite;

- The quantities of waste managed onsite;
- The general sequences of management operations the leachate went through onsite during 1986;
- The quantities of waste discharged to POTWs or discharged under NPDES permits; and
- The quantities of waste shipped offsite for treatment(s) performed.

This information was used to identify waste management practices for leachates.

Questions 20 through 27 provide information on the physical and chemical characteristics of the leachate. Responses to Questions 20 through 27 provided such information as metals content and the range in concentration of other hazardous constituents. This information is used to determine leachate treatability categories.

A.2.3 Leachate Treatability Study Plan

A team of industry representatives, including Chemical Waste Management (CWM)/Waste Management of North America (WMNA), Browning Ferris Industries (BFI)/CECOS, DuPont, and Dow Chemical, have provided EPA with information on treatment of leachate. As part of this effort, the industry representative have put together a study plan on leachate. The five tasks comprising the study plan are:

- Task 1 - Characterization of leachate;
- Task 2 - Full-scale performance evaluation;
- Task 3 - Bench-scale treatment plant operation;
- Task 4 - Stabilization of treatment residues and leachate; and
- Task 5 - Documentation and reporting.

Of these five tasks, only Task 1 has been completed and submitted to EPA by all four industry participants. Because of the large amount of information, these data have been summarized into a more usable format. The leachate characterization data include a list of BDAT constituents found in untreated leachate; the constituent's F001 - F005 BDAT levels, if applicable; the constituent's minimum and maximum BDAT levels; the number of facilities reporting the constituent in its leachate; and the constituent's average and maximum concentrations found in the leachate. Only one industry representative, Chemical Waste Management submitted data for Task 2. However, these data were not summarized in time for this analysis.

In conjunction with the leachate treatability study, the Leachate Treatability Group surveyed treatment and disposal firms to determine the volumes of leachate-derived solids produced. These data were submitted to EPA through Dupont by GSX Chemical Services, Mill Service, Inc., US Ecology, Envirosafe Management Services, Inc., Dow Chemical, and Casmalia Resources.

A.2.4 Other Data Sources

EPA reviewed documents from the court case **Chemical Waste Management, Inc. (CWM) vs. U.S. EPA** and comments from previous land disposal restrictions rules. However, these data were of limited use in this analysis.

A.2.5 Data Sources Used in the Analysis

The main source of information for the leachate capacity analysis was derived from the TSDR Capacity Data Set and the TSDR Survey, especially the facility schematics. Data from the Generator Survey and from the hazardous waste management industry were also used by EPA.

The information from the Leachate Treatability Study Plan included little or no data on total quantities treated at the facilities or the quantity of residuals generated. Also, the summarized data do not provide information on physical characteristics of the leachate and its treatment residuals. The leachates are often blended with other waste streams prior to treatment in a wastewater treatment plant, so that concentrations may drop significantly after blending with other wastes going to wastewater treatment. Because of the nature of these study plans, the information was not used in the capacity analysis. However, EPA did use data submitted by the Leachate Treatability Group on the volumes of leachate-derived solids and sludges generated and land disposed.

The other data sources examined by EPA did not provide specific information on the generation and management of multi-source leachate that is needed for this analysis.

A.3 METHODOLOGY

The objective of this analysis is to determine whether adequate alternative treatment capacity exists for the volumes of multi-source leachate that will become subject to the land disposal restrictions. This section describes how EPA used the data sources described in section A.2 to determine the volumes of multi-source leachate requiring alternative treatment or recovery, and to determine whether the available capacity to treat these wastes is sufficient.

A.3.1 Determination of Volumes of Multi-Source Leachate Requiring Alternative Treatment Capacity

The first step in determining whether there is adequate treatment or recovery capacity for the volumes of multi-source leachate affected by the land disposal restrictions is to estimate these volumes.

Respondents to the TSDR Survey were asked to identify the quantity of multi-source leachate (coded as XLEA) going to land disposal units onsite, being sent to land disposal units offsite, or being received from other facilities. These data constituted the baseline of EPA's estimates of the quantity of multi-source leachate actually being land placed.

Table A-3

AVAILABLE CAPACITY FOR TECHNOLOGIES RECOMMENDED FOR TREATING MULTI-SOURCE LEACHATE

Multi-Source Leachate Category	BDAT Technology	Available Capacity (million gals/year)
Organic Wastewaters	Wet Air Oxidation followed by Carbon Adsorption or Biological Treatment followed by Carbon Adsorption	6
Inorganic Wastewaters	Chemical Precipitation	339
Organic/Inorganic Wastewaters	Wet Air Oxidation followed by Carbon Adsorption followed by Chemical Precipitation or Biological Treatment followed by Carbon Adsorption followed by Chemical Precipitation	<1
Organic Nonwastewaters	Combustion of Sludges/ Solids	<1
Inorganic Nonwastewaters	Stabilization	345
Organic/Inorganic Wastewaters	Combustion of Sludges/ Solids followed by Stabilization	<1

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Table A-4

REQUIRED ALTERNATIVE COMMERCIAL TREATMENT/RECYCLING CAPACITY FOR SURFACE DISPOSED MULTI-SOURCE LEACHATE
(million gallons/yr)

Technology	Available Capacity	Required Capacity	Variance
Organic Wastewaters			
Wet Air Oxidation followed by Carbon Adsorption or Biological Treatment followed by Carbon Adsorption	6	1	NO
Inorganic Wastewaters			
Chemical Precipitation	339	0	NO
Organic/Inorganic Wastewaters			
Wet Air Oxidation followed by Carbon Adsorption followed by Chemical Precipitation or Biological Treatment followed by Carbon Adsorption followed by Chemical Precipitation	<1	<1	NO
Organic Nonwastewaters			
Combustion of Sludges/Solids	<1	<1	YES
Inorganic Nonwastewaters			
Stabilization	345	<1	NO
Organic/Inorganic Nonwastewaters			
Combustion of Sludges/Solids followed by Stabilization	<1	34	YES

Table A-5

REQUIRED ALTERNATIVE COMMERCIAL TREATMENT/RECYCLING CAPACITY FOR DEEPWELL DISPOSED MULTI-SOURCE LEACHATE

(million gallons/yr)

Technology	Available Capacity	Required Capacity	Variance
Organic/Inorganic Wastewater			
Wet Air Oxidation followed by Carbon Adsorption followed by Chemical Precipitation or Biological Treatment followed by Carbon Adsorption followed by Chemical Precipitation	<1	13.4	YES

The analysis of the quantitative data clearly indicates a need for a variance for sludge/solid residuals needing incineration. The general information from other facilities clearly indicates that additional quantities of sludge/solid residuals are being generated and land disposed. However, these volumes are already in the variance category.

EPA is estimating that multi-source leachate containing both organic and inorganic constituents are currently underground injected. The Agency is proposing a treatment standard for multi-source leachate wastewaters based on wet-air oxidation followed by carbon adsorption, biological treatment followed by carbon adsorption, or incineration for wastes containing organic constituents, and on chemical precipitation and filtration for wastes containing inorganic constituents. Because there is insufficient capacity to treat wastewaters based on these treatment technologies, EPA is proposing to grant a two-year variance for multi-source leachate that is underground injected.

The data analysis indicates that most of the multi-source leachate land disposed contains both organic and inorganic constituents. Therefore, EPA believes that the setting of standards for wastewaters and nonwastewaters for multi-source leachate is appropriate.

A.5.5 Attachments

Attachment A summarizes the data used in this analysis by facility. Exhibit A-1 presents the volumes of multi-source leachate surface-disposed. Exhibit A-2 presents the volumes of multi-source leachate deepwell-disposed. Exhibit A-3 presents the volumes of multi-source leachate for which there was generation information but where the management and disposal of multi-source leachate was uncertain.

Attachment B presents EPA's detailed analysis of each facility examined which reported generating or disposing of multi-source leachate. The analysis is presented in three sections. Sections B-1 and B-2 present the analysis of facilities for which data on multi-source leachate generation and management were used to support the variance determinations for surface-disposed and deepwell-disposed multi-source leachate. Section B-3 discusses the review of data for facilities that reported the generation of multi-source leachate but for which the information on management and disposal of multi-source leachate was inconclusive.

ATTACHMENT A

PRESENTATION OF DATA

SUMMARY OF DATA

EXHIBIT A-1

QUANTITY OF MULTI-SOURCE LEACHATE SURFACE-DISPOSED
(Gallons/Yr)

Facility ID	Facility Name	Organic WW	Inorganic WW	Organic NWW	Inorganic NWW	Potentially Both WW	Potentially Both NWW	Quantity Generated
Data from the TSDR/Generator Surveys								
ALD000622464	Chemical Waste Management					485,690		485,690
ILD010284248	Chem Waste Mgt - CID landfill						5,572,776	7,810,899
MID980617435	Dow Chemical, Salzburg Landfill						160,800	160,800
NJD002385730	DuPont Chambers Works						20,640,000	69,888,000
NYD002080034	GE Waterford						5,100,000	250,000
NYD080336241	Cecos International Inc.						168,000	6,976,080
PAD000429589	GROWS, Inc						129,360	11,257,125
PAD004835146	Mill Service, Yukon Plant						48,000	22,000,000
PAD059087072	Mill Service, Inc.				240,000 D			27,118,800
SCD070375985	GSX Services of South Carolina						1,200	282,960
TXD000835249	Gulf Coast Waste Disposal					312,000		312,000
Data Submitted by the Hazardous Waste Management Industry								
	Dow - Michigan Division WWTP						1,440,000	4,320,000
	U.S. Ecology						48,000	48,000
	GSX - Ohio						499,200	499,200
TOTAL		0	0	0	240,000	797,690	33,807,336	151,409,554

Quantities originally reported in tons were converted using a 240 gallons/ton conversion factor.

Data Sources: Surveys and Data Submitted by Industry

EXHIBIT A-2

QUANTITY OF MULTI-SOURCE LEACHATE DEEPWELL DISPOSED
(Gallons/Yr)

Facility ID	Facility Name	Organic WW	Inorganic WW	Organic NWW	Inorganic NWW	Potentially Both WW	Potentially Both NWW	Quantity Generated
Data from the TSDR/Generator Surveys								
LAD000618256	Cecos International Inc.					1,352,640		1,352,640
LAD000618298	Cecos International Inc.					3,250,000		3,250,000
LAD010395127	Rollins Environmental Services					3,341,520		17,210,880
TOTAL		0	0	0	0	7,944,160	0	21,813,520
CBI		0	0	0	0	5,417,520	0	11,080,147
TOTAL CBI AND NON-CBI		0	0	0	0	13,361,680	0	32,893,667

Quantities originally reported in tons were converted using a 240 gallons/ton conversion factor.

Data Sources: Surveys and Data Submitted by Industry

EXHIBIT A-3

FACILITIES REPORTING MULTI-SOURCE LEACHATE GENERATION (GALLONS/YR)

Facility ID	Facility Name	Quantity Generated
Data from the TSDR/Generator Surveys		
ALD004019048	Monsanto Co. Anniston Facility	102,766
CAD000060012	IT Corp, Panoche Facility	24,024,000
CAD053049490	Stauffer Chemical	7,929,120
CAD069130995	Hewlett-Packard Co.	1,741,000
ILD074411745	ESL Inc.	304,100
MDD000797365	BFI	508,200
MID005068507	Sundstrand Heat Transfer, Inc	0
MID048090633	Wayne Disposal Inc Site #2	2,600,000
MID980568711	Ford Motor Co., Allen Park	1,500,000
MOD068521228	B.H.S., Inc	155,000
NYD000818419	Ciba-Geigy Corp	2,966,000
NYD060545209	Al Tech Specialty Steel	5,228,880
OHD068111327	Evergreen Landfill	175,680
OHD087433744	Cecos International Inc.	5,032,532
OKD065438376	USPCI	4,194,000
PAD000443705	Western Berks Refuse Authority LF	3,244,730
PRD090028101	Merck, Sharp & Dohme, Quimica de	34,853,520
PRD980594618	Union Carbide Caribe, Inc	1,825,000
TXD055141378	Rollins Environmental Services	12,096,000
TXD069452340	Texas Ecologists, Inc	890,000
WID076171008	Land Reclamation ltd	4,000,000
WID098547854	Metro LF and Dev. Project	7,878,000
WVD005005509	Union Carbide Agric. Prod. Co.	1,052,160

EXHIBIT A-3

FACILITIES REPORTING MULTI-SOURCE LEACHATE GENERATION
(GALLONS/YR)

Facility ID	Facility Name	Quantity Generated
Data Submitted by the Hazardous Waste Management Industry		
	Envirosafe - Ohio	247,440
	Envirosafe - Idaho	3,360
	Casmalia Resources	1,009,500
TOTAL		123,560,988

Quantities originally reported in tons were converted using a 240 gallons/ton conversion factor.

Data Sources: Surveys and Data Submitted by Industry

ATTACHMENT B

PRESENTATION OF DATA

ANALYSIS OF FACILITY DATA

Section B-1

This Section presents the information on facilities reporting both the generation and the surface disposal of multi-source leachate, along with the rationale for including the volumes of multi-source leachate requiring alternative treatment capacity in the analysis.

ALD00622464

Chemical Waste Management

Evaluation of the generation and management of multi-source leachate at this facility involved analysis of the TSDR and Generator Surveys. Information in the TSDR Survey, including its schematic, were classified as Confidential Business Information (CBI) for this facility. Data in the Generator Survey, not classified as CBI, indicated that 485,000 gallons of multi-source leachate are generated. The Generator Survey also reported that the entire volume generated was land disposed on-site. The presence of both organic and inorganic constituents is indicated by the data, and the listed volume of 100 percent water content was used to classify the waste as wastewater. Thus, 485,000 gallons were assigned as organic/inorganic wastewater that is surface disposed.

ILD010284248

Chemical Waste Management - CID Landfill

The survey data indicated that approximately 7.8 million gallons of multi-source leachate are generated at this facility. Both organic and inorganic constituents are present in the leachate. The survey data show that several treatment technologies are applied to the entire leachate volume. After treatment, liquid wastes are discharged to a POTW under an NPDES permit. Waste treatment sludges, which amount to approximately 5.6 million gallons, are land disposed in an on-site landfill. The volume land disposed is included in this capacity analysis as a multi-source leachate treatment residual requiring alternative treatment.

MID980617435

Dow Chemicals Salzburg Landfill

The survey data indicated that 670 tons (160,800 gallons) of leachate-contaminated soils are disposed in an on-site hazardous waste landfill. The survey data also indicated that 9.5 million gallons of leachate are generated from the landfill and accumulated in tanks regulated under the 90-day rule, and are sent off-site to a wastewater treatment plant operating under an NPDES permit. Because of the uncertainty of the quantity of solid residuals generated by the off-site wastewater treatment plant, this volume was not included in the analysis. However, the 160,800 gallons of multi-source leachate contaminated soil was included in this analysis.

NJD002385730

DuPont Chambers Works

The facility schematic from the TSDR Survey indicated that approximately 70 million gallons of waste is contaminated with multi-source leachate and must be treated. DuPont has submitted data indicating that it generates 240 wet tons/day (approximately 20 million gallons/year) of primary and secondary sludge. This sludge is currently being landfilled on-site. In the future, leachate and groundwater will be segregated, and secondary sludges will be incinerated until an on-site carbon regeneration furnace is on-line. For this analysis, the waste volume being land disposed has been included.

NYD002080034

GE Waterford

The survey data indicated that 250,000 gallons of multi-source leachate were generated by this facility. The survey data also indicated that 1,815 gallons per minute (approximately 954 million gallons per year) of leachate from the on-site landfill is sent to an on-site wastewater treatment system. From the wastewater treatment system, 21,250 tons (approximately five million gallons) of dewatered multi-source leachate treatment residuals are sent to a landfill. These five million gallons of nonwastewaters were, therefore, included in this analysis.

NYD080336241

Cecos International Inc.

The survey data indicated that approximately seven million gallons of multi-source leachate are generated by this facility. These wastes are treated on-site and the effluent sent to a POTW. Additional information submitted by Cecos/BFI indicated that approximately 168,000 gallons of filter-pressed bio-sludge from wastewater treatment is sent off-site for regeneration and land disposal. This waste volume has been included in the analysis.

PAD000429589

Grows, Inc.

The survey data indicated that approximately 11 million gallons of multi-source leachate are generated by this facility. The survey data also indicated that 539 tons (approximately 130,000 gallons) of filter cake from the wastewater treatment plant is sent to an off-site landfill without treatment. This filter cake may require treatment as a nonwastewater prior to disposal and, therefore, has been included in this analysis. The remaining effluent is discharged under an NPDES permit and is, therefore, not included in this analysis.

PAD004835146

Mill Service Yukon Plant

The survey data indicated that approximately 22 million gallons of multi-source leachate are generated by this facility. The survey data also indicated that the multi-source leachate is discharged to a POTW after treatment. Data recently submitted to EPA by the facility indicate that 200 tons (48,000 gallons) of metal hydroxide treatment residuals are generated and disposed. Because oxidation and chlorination are treatment steps reported in the survey data, it was believed that some cyanide wastes may be present, and therefore, the waste residuals were identified as wastewaters containing both organic and inorganic constituents. In the analysis, 48,000 gallons of multi-source leachate treatment residuals were identified as being land disposed at this facility.

PAD059087072

Mill Service, Inc.

The survey data indicated that approximately 27 million gallons of multi-source leachate are generated by an on-site surface impoundment. The leachate is treated on-site, with treatment effluent discharged under a NPDES permit, and treatment sludges returned to an on-site surface impoundment. The facility did not identify this practice as land disposal but as recycling. EPA believes, however, that disposing of a sludge in a surface impoundment constitutes land disposal. This facility supplied updated information to EPA indicating that 1,000 tons (240,000 gallons) of metal hydroxide sludges are generated and land disposed. These treatment residuals were included in the analysis as inorganic nonwastewaters.

SCD070375985

GSX Services of South Carolina

The survey data indicated that approximately 280,000 gallons of leachate were generated, and 1,200 gallons land disposed on-site. The survey data indicated that on-site treatment is available. It was assumed that the 1,200 gallons of waste are leachate treatment residuals, and have been included in the analysis.

TXD000835249

Gulf Coast Waste Disposal

The survey data indicated that approximately 312,000 gallons of multi-source leachate are sent to on-site land treatment. The survey data also indicated that this practice was to have stopped in 1988. Because it is uncertain if this practice has stopped, the 312,000 gallons of leachate have been included in this analysis.

Dow Chemical Company, Michigan Division

Dow Chemical submitted data indicating that its Michigan Division Wastewater Treatment Plant generates both primary and secondary solids from the treatment of multi-source leachate. Approximately three million gallons of primary solids are generated from clarification of wastewater treatment plant's influent stream. Approximately one million gallons of secondary solids are generated from wasting of activated sludge from the aeration basin. Primary solids are treated on-site by incineration. Secondary solids are land disposed. This volume of secondary solids, therefore, has been included in the capacity analysis.

U.S. Ecology

U.S. Ecology submitted data indicating that one of its facilities in Robstown, Texas generates solid residuals from the treatment of leachate and contaminated groundwater. An estimated 48,000 gallons of leachate treatment residuals are generated on an annual basis. The company is currently working on a "no migration" petition for two Class I injection wells with the intent of deepwell disposing of site-generated leachates and groundwater. For this analysis, however, the leachate treatment residual volumes have been included.

GSX Chemical Services of Ohio, Inc.

GSX Chemical Services of Ohio, Inc. submitted data indicating that it generates approximately 40 tons per week (499,200 gallons per year) of filter cake residuals from the treatment of multi-source leachate. The filter cake residuals are currently being land disposed. Their waste volumes, therefore, have been included in this analysis.

Section B-2

This Section presents the analysis of facilities reporting both the generation and the deepwell disposal of multi-source leachate. For each of these facilities, a paragraph is included explaining the rationale for including volumes of multi-source leachate requiring alternative treatment capacity in the analysis.

LAD000618256

Cecos International Inc.

Analysis of the survey data showed that approximately one million gallons of multi-source leachate were generated at this facility, and that this entire volume was disposed by underground injection. The survey data indicated that both organic and inorganic constituents were present in the leachate. Therefore, one million gallons of multi-source leachate were identified as being deepwell disposed at this facility.

LAD000618298

Cecos International

The survey data indicated that approximately three million gallons of multi-source leachate are sent off-site for disposal to another facility containing a deepwell injection unit. Therefore, this volume was identified as being deepwell disposed.

LAD010395127

Rollins Environmental Services

According to the survey data, approximately 17 million gallons of multi-source leachate were generated at this facility. The survey data only reported the disposal of approximately 3 million gallons of leachate. Because the facility notes indicated that the leachate is sent to deepwell disposal, and because of the uncertainty of any other on-site management practices for leachate, only the reported 3 million gallons of leachate being land disposed was assigned to deepwell disposal.

Section B-3

This section presents the available data for facilities that reported generation of multi-source leachate but for which the information on the management of leachate was incomplete or contained uncertainties. Many of these facilities may generate multi-source leachate residuals from wastewater treatment. The volumes of such residuals were not included in this analysis due to uncertainties. Many facilities reported in the schematics of the TSDR Survey discharging multi-source wastewater treatment effluents under an NPDES permit or to a POTW and stated that the residuals from wastewater treatment were non-hazardous wastes. This may have been due to a misinterpretation of the definition of multi-source leachate which carries the codes of all the wastes from which it is derived.

EPA did not analyze the potential volumes of multi-source leachate residuals from wastewater treatment because of uncertainty or incompleteness in the data sources as to the management practices for multi-source leachate and specifically the volumes of leachate residuals generated and land disposed.

The following facility profiles identify the reasons for not including volumes of multi-source leachate requiring alternative treatment capacity at these facilities.

ALD004019048

Monsanto Co. Anniston Facility

Evaluation of survey data showed that 103,000 gallons of multi-source leachate were generated at this facility. Survey notes indicate that multi-source leachate undergoes biological treatment. The survey reported that treatment residuals leaving the treatment unit are delisted. Therefore, no volumes of multi-source leachate were identified as being land disposed at this facility.

CAD000060012

IT Corp., Panoche Facility

Evaluation of survey data showed that approximately 24 million gallons of multi-source leachate are generated. The survey data, though, did not clearly identify leachate treatment or generation of leachate treatment residuals. Because of uncertainty in leachate treatment and residual generation, no leachate or leachate treatment residuals were identified in the analysis.

CAD053049490

Stauffer Chemical

Evaluation of survey data showed that approximately 8 million gallons of multi-source leachate are generated. The survey data indicated that a portion of the leachate is treated by chemical precipitation in an exempt wastewater treatment unit (i.e., tanks). After treatment, liquid wastes are discharged under an NPDES permit. Residuals from this treatment, along with the remainder of the leachate volume, undergo further treatment in a surface impoundment. The facility indicated that treatment in the surface impoundment would be replaced in the future by a wastewater treatment system. However, because it was uncertain if the wastewater treatment system was on-line and if the system was generating solid residuals, no treatment residual volumes were identified for this facility in the analysis.

CAD069130995

Hewlett-Packard Co.

Evaluation of survey data showed multi-source leachate being treated by a groundwater treatment system. The survey data indicated that approximately 1.74 million gallons of leachate were treated by air stripping, with volatile organics going to the atmosphere and non-hazardous waste effluent being discharged under an NPDES permit. No multi-source leachate were indicated as being land disposed at this facility and no nonwastewater treatment residuals were reported generated. It should be noted, however, that the current treatment technology may not be acceptable after promulgation of the Third Third Rule.

ILD074411745

ESL Inc.

According to survey data, this facility generated approximately 300,000 gallons of multi-source leachate in 1986. The survey data indicated that the leachate is treated on-site, then discharged to a POTW under a NPDES permit. Solid residuals resulting from leachate treatment were not identified in the survey data. Because of the uncertainty as to the quantity of solid treatment residuals generated, no treatment residuals were identified for this facility in the analysis.

MDD000797365

BFI

The survey data identified approximately 500,000 gallons of multi-source leachate generated at this facility. The only on-site leachate management practices identified were accumulation and storage in tanks. Because of the uncertainty of leachate management and solid treatment residual generation, no leachate waste volumes were identified as requiring alternative treatment for this facility in the analysis.

MID005068507

Sundstrand Heat Transfer, Inc.

Investigation of the survey data indicated that approximately 735 million gallons of contaminated ground water were treated in an on-site wastewater treatment system. The survey data indicated that the leachate resulted from the contamination of ground water by leaking on-site tanks. These tanks contained only F002 wastes. The contaminated ground water resulting from leaking tanks containing only a single RCRA waste were considered single-source leachate. Consequently, because the waste did not fit the definition of multi-source leachate, this volume was not included in the analysis.

MID048090633

Wayne Disposal Inc, Site # 2

The survey data identified approximately three million gallons of multi-source leachate generated by this facility. The survey data also indicated that the multi-source leachate is sent off-site to a POTW for treatment. Because of the uncertainty of the quantity of treatment residuals generated by the POTW, no waste volumes were included in the analysis.

MID980568711

Ford Motor Company, Allen Park

The survey data identified approximately two million gallons of multi-source leachate generated. This multi-source leachate was reported discharged to a POTW without prior treatment. Because of the uncertainty of the quantity of treatment residuals resulting from treatment by the POTW, no waste volumes were included in the analysis.

MOD068521228

B.H.S., Inc.

The survey data indicated that 155,000 gallons of multi-source leachate is generated at this facility. The survey data also indicated that between 1986 and 1987, leachate would be either treated by solar evaporation or sent off-site to a POTW, and that beginning in 1988 all leachate would be sent off-site to a POTW. Because of the uncertainty of treatment residual generation by the POTW, no waste volumes of leachate treatment residuals were included in the analysis.

NYD000818419

Ciba-Geigy Corp

The survey data indicated that approximately 3 million gallons of multi-source leachate is generated by this facility. The survey data also indicated that all generated leachate is sent off-site to a wastewater pre-treatment facility. Treatment residual generation was not reported in the survey data. Because of the uncertainty of the quantity of treatment residuals generated, no waste volumes for treatment residuals were included in the analysis.

NYD060545209

Al Tech Specialty Steel

The survey data indicated that approximately five million gallons of multi-source leachate are generated at this facility. The survey data indicated that the leachate from an on-site landfill is sent to a wastewater treatment system where the wastewater is subjected to chromium reduction, chemical precipitation, and vacuum filtration. The resulting dewatered sludge is disposed in an on-site landfill, and the effluent is discharged under an NPDES permit. The dewatered sludge is reported by the facility as being non-hazardous. Because of the uncertainty of the "hazardousness" of the dewatered sludge, its associated waste volume was not included in the analysis.

OHD068111327

Evergreen Landfill

The survey data indicated that 175,680 gallons of leachate are generated from an on-site landfill. The survey data also indicated that the leachate is discharged to a POTW after treatment, however, only accumulation in tanks was identified as an on-site management practice. Because of the uncertainty of on-site treatment of the leachate and generation of leachate treatment residuals, no waste volumes from this facility were included in the analysis.

OHD087433744

Cecos International, Inc.

The survey data indicated that approximately five million gallons of multi-source leachate were generated on-site by this facility. The survey data indicated that the multi-source leachate is accumulated on-site, sent off-site for treatment, and then discharged to a POTW after treatment. No generation of treatment residuals was reported. Because of the uncertainty of treatment residual generation, no leachate treatment residual volumes were included in the analysis.

OKD065438376

USPCI

The survey data indicated that approximately four million gallons of multi-source leachate is generated by this facility. The facility stabilizes on-site wastewater treatment sludges. This could possibly meet the treatment standard for inorganic nonwastewaters, however, this would not meet the treatment standard for organic wastewaters. Because of the uncertainty of the composition of the treatment sludge, its associated waste volume was not included in the analysis.

PAD00443705

Western Berks Refuse Authority

The survey data indicated that approximately three million gallons of multi-source leachate are generated by an on-site landfill. The survey data identified that the generated leachate is sent by tank truck to an off-site hazardous waste treatment plant. No leachate treatment residuals were reported. Because of the uncertainty of the quantity of residuals generated, no waste volume was included in the analysis.

PRD090028101

Merck, Sharp & Dohme, Quimica de Puerto Rico

The survey data indicated that approximately 35 million gallons of multi-source leachate are generated from an on-site landfill at this facility. The survey data identified only F005, XASB, and non-hazardous wastes as being land disposed. Since the leachate generated by the landfill is not multi-source but single-source, the waste volume was not included in the analysis.

PRD980594618

Union Carbide Caribe, Inc.

The survey data indicated that approximately two million gallons of leachate were generated by this facility. The leachate is treated on-site with the treated effluent being discharged under an NPDES permit. No leachate residual volumes were reported land disposed by the facility. Because of the uncertainty of treatment residual generation, no residual volumes were included in the analysis.

TXD055141378

Rollins Environmental Services

The survey data indicated that approximately 12 million gallons of multi-source leachate were generated by this facility. The survey data identified the following treatment processes for multi-source leachate: storage in tanks, followed by on-site treatment, including activated sludges, lime precipitation, flocculation, and gravity thickening. Effluent from treatment is either discharged under an NPDES permit or recycled to incineration scrubbing. Treatment residuals are stabilized and disposed in an on-site landfill. Because of the uncertainty of the waste's composition, it was believed possible that the stabilized treatment residuals could meet BDAT standards, and, therefore, their waste volumes were not included in the analysis.

TXD069452340

Texas Ecologists, Inc.

The survey data indicated that 890,000 gallons of multi-source leachate were generated from an on-site landfill. The survey data also indicated that the leachate is sent off-site for treatment. Because of the uncertainty of treatment residuals generated from leachate treatment, no leachate waste volumes were included in the analysis.

WID076171008

Land Reclamation Ltd.

The survey data indicated that approximately four million gallons of multi-source leachate are generated. The survey data also indicated that the leachate was discharged to a POTW without prior treatment. Because of the uncertainty of treatment residuals generated from leachate treatment, no leachate waste volumes were included in the analysis.

WID098547854

Metro Landfill and Development Project

The survey data indicated that approximately eight million gallons of multi-source leachate are generated. The survey data also indicated that the leachate is accumulated in tanks then discharged to a POTW without prior treatment. Because of the uncertainty of treatment residuals generated from leachate treatment, no leachate waste volumes were included in the analysis.

WVD005005509

Union Carbide Agricultural Production Company

The survey data indicated that approximately one million gallons of multi-source leachate were generated. The survey data also indicated that leachate is treated in a wastewater system prior to discharge under an NPDES permit. Generated hazardous wastewater treatment sludge is disposed either in a landfill or off-site in a surface impoundment, however, the survey data did not report these quantities. Because of the uncertainty of the quantity of treatment residuals generated, no residual volumes were included in the analysis.

Envirosafe Services of Ohio, Inc.

Envirosafe Services of Ohio, Inc. submitted data on the generation of leachate treatment residuals. The facility projected generating 1,031 tons of leachate treatment sludge (247,440 gallons) in 1990. These treatment residuals are currently being sent off-site for treatment. Because no information was submitted on the off-site management of these treatment residuals, these residual volumes were not included in the analysis.

Envirosafe Services of Idaho, Inc.

Envirosafe Services of Idaho, Inc., submitted data on its projected estimates of leachate treatment residuals. The facility projected generating 14 tons of leachate treatment sludges (3,360 gallons) for 1990. The treatment sludges were originally placed in an evaporation impoundment meeting minimum technology requirements. Because of the uncertainty of the composition and management of the treatment residuals, their waste volumes were not included in the analysis.

Casmalia Resources

Casmalia Resources submitted data on leachate generation. The facility recently lost the use of its surface impoundments and plans on replacing them with a chemical fixation system. The amount of leachate to be stabilized is approximately one million gallons per year. Because of the uncertainty of the composition and management of the treatment residuals, their waste volumes were not included in the analysis.

APPENDIX B
MIXED RADIOACTIVE WASTE CAPACITY ANALYSIS

Mixed radioactive wastes are radioactive and are contaminated with RCRA hazardous wastes. Consequently, these wastes are subject to dual regulation; EPA standards apply to the RCRA hazardous portion and Nuclear Regulatory Commission (NRC) or Department of Energy (DOE) requirements apply to the radioactive portion.

The treatment standards being proposed as part of this Third Third Land Disposal Restriction (LDR) proposed rule will apply to RCRA wastes mixed with radioactive wastes. EPA, therefore, has undertaken an analysis of the generation and available alternative treatment capacity for mixed radioactive wastes in an effort to determine the need for a National Capacity Variance from the LDRs. This appendix outlines the analysis of mixed radioactive wastes that was performed, including the methodology used for evaluating the generation and capacity information. It also presents the results of the analysis and explains why EPA is proposing to grant a national capacity variance to all surface-disposed mixed radioactive wastes.

B.1 Background

B.1.1 Definition of Mixed Radioactive Waste

EPA has defined a mixed radioactive waste as any matrix containing a RCRA hazardous waste and a radioactive waste subject to the Atomic Energy Act (53 FR 37045, 37046, September 23, 1988). Because the radioactive and RCRA hazardous components of mixed radioactive wastes are often inseparable, mixed radioactive wastes are subject to dual regulation. Atomic Energy Act requirements apply to the radioactive portion of mixed radioactive wastes, and the Department of Energy (DOE) or the Nuclear Regulatory Commission (NRC) is responsible for promulgating and enforcing the requirements. RCRA standards apply to the hazardous components of these wastes, and EPA is responsible for promulgating and enforcing the standards.

B.1.2 Status of Mixed Radioactive Wastes in the LDR Program

Radioactive wastes that are mixed with spent solvents, dioxins, or California list wastes are subject to the land disposal restrictions already promulgated for those hazardous wastes. EPA determined that radioactive wastes that are mixed with First Third and Second Third wastes will be included in the Third Third rulemaking (40 CFR 268.12(c)). Thus, today's proposal addresses radioactive wastes that contain First Third, Second Third, and Third Third wastes.

B.1.3 Distinctions Based on Radioactivity

Radioactive wastes are often separated into groups according to their relative radioactivity (EPA, March 1987). These divisions include high-level wastes (HLW), transuranic (TRU) wastes, and low-level wastes (LLW). The processing of nuclear reactor fuels generates two types of HLW: One resulting from dissolving naval reactor fuel elements to recover enriched uranium; the other resulting from dissolving nuclear reactor fuel elements to recover uranium. HLW are generated in a liquid form, and most HLW have hazardous chemical characteristics (e.g., corrosivity and toxicity). HLW may also contain listed RCRA hazardous wastes. The primary hazard normally associated with HLW, however, is their intense radioactivity.

TRU wastes contain alpha-emitting transuranic isotopes with half-lives greater than 20 years. They also contain more than 100 nanocuries per gram of waste. TRU wastes are generated during the processing, shaping, and handling of plutonium-containing materials. TRU wastes can be solid (e.g., gloves, rags, and tools) or liquid and may contain listed or characteristic RCRA hazardous wastes.

LLW result from more varied processes than either HLW or TRU wastes. LLW are generated during a variety of activities, and several RCRA waste codes are potential LLW contaminants. Among the most significant LLW contaminants are organic chemicals, including liquid scintillation cocktails, and lead metals used for containers and shielding.

Regardless of the type of radioactive constituents that mixed radioactive wastes contain (i.e., high-level, low-level, or TRU), these wastes are currently subject to RCRA hazardous waste regulations, including applicable land disposal restrictions.

B.1.4 Types of Mixed Radioactive Waste Generators

For the purpose of the Third Third capacity analysis, mixed radioactive waste generators were separated into two groups: DOE facilities and non-DOE facilities. DOE facilities generate the largest quantities of mixed radioactive wastes of all groups. For this reason, the capacity analysis focused on DOE facilities.

Most non-DOE facilities that generate mixed radioactive wastes are commercial operations. Federal agencies other than DOE, including the Department of Agriculture and the National Institutes of Health, generate mixed radioactive wastes that are similar to those generated by other non-DOE facilities. In general, non-DOE facilities can be grouped into the following categories:

- Nuclear power plants (e.g., boiling water and pressurized water reactors);
- Medical institutions (e.g., research and clinical activities);
- Academic institutions (e.g, non-medical research); and
- Industrial facilities (e.g., pharmaceutical, sealed source, and irradiator manufacturers, biotechnical manufacturers, spent fuel storage facilities, and waste processors).

B.2 Information and Data Sources

In support of this capacity analysis, EPA collected the available information on the generation, characterization, and management of mixed radioactive wastes.

B.2.1 Department of Energy Data

EPA recognized that a large amount of radioactive wastes generated at DOE facilities are contaminated with RCRA hazardous wastes. In cooperation with EPA, DOE provided data to EPA outlining the generation, treatment, and disposal of mixed radioactive wastes at DOE facilities. DOE provided these data in a series of tables for 21 DOE facilities. The data included volume of waste streams generated annually and in storage, current treatment capacity, and planned treatment. The majority of the capacity analysis for mixed radioactive wastes was based on these data.

B.2.2 Information on Non-DOE Mixed Radioactive Waste

In an effort to obtain as much information as possible on the characterization, generation, and management of non-DOE mixed radioactive wastes, EPA investigated several potential sources of information. These included hazardous waste management and generation surveys, summary reports on mixed radioactive waste generation and management, available state surveys and interstate compact surveys and reports, as well as phone contacts with several state, regional, and federal government officials and industry representatives. Attachment B-1 to this appendix outlines these sources of information in more detail.

Although EPA believes that the information collected for this analysis is the best available, EPA recognizes that the information on the quantities of mixed radioactive wastes generated and managed at non-DOE facilities could be improved. Consequently, in the proposed Third Third rule the Agency has requested comments by interested parties on the current generation and management of mixed radioactive wastes.

B.3 Methodology for Analyzing DOE Data

After analyzing available information, EPA believes that the DOE data set represented the most accurate information on mixed radioactive wastes available. EPA also determined that the quantities of mixed radioactive wastes generated at DOE facilities constitute a significant portion of all mixed radioactive wastes generated. For these reasons, the capacity analysis focused primarily on the data provided by DOE. The following sections describe the methodology and assumptions used in the capacity analysis.

B.3.1 DOE Generation of Mixed Radioactive Waste

To estimate the quantity of DOE mixed radioactive wastes, DOE annual generation rates were combined with the quantities of untreated wastes currently in storage at DOE facilities (i.e., estimated inventory at the end of 1989). The annually-generated volumes and volumes in storage were combined because EPA assumed that all untreated wastes constitute a demand for treatment.

EPA used DOE estimates of these combined quantities. The DOE methodology for developing these numbers involved estimating the total inventory as of July 1989 and adding one half of the annual generation rate to estimate the total volume of each waste stream requiring treatment at the end of 1989.

B.3.2 Facility-by-Facility Analysis of DOE Mixed Radioactive Waste Generation

Analysis of the data provided by DOE involved grouping waste streams according to the applicable best demonstrated available technology (BDAT) at each DOE facility. A key issue in this analysis was how to address several of the DOE waste streams that contained more than one RCRA waste code, many with different BDATs. To prevent double-counting of waste quantities when grouping the wastes by treatability group, the streams were divided by assigning an equal portion of the quantities to each waste code (i.e., straight proportionality). For example, DOE may have provided a single volume (e.g., 20,000 gallons) for a stream called "wastewater treatment sludge," which contains D001, D008, D009, and D011. Using straight proportionality, each waste code would be assigned 5,000 gallons. Although this procedure may not be the most precise way of assigning volumes, EPA believes that the conclusion of this analysis would remain the same if another, more complex method was used.

B.3.3 DOE Treatment Capacity

Estimates of RCRA treatment capacity were developed using DOE-supplied data on each of the treatment units located at the various facilities. EPA determined whether the given treatment was a BDAT or BDAT equivalent for the particular wastes treated in that unit. DOE also provided considerable data on planned treatment units and their capacities. Because these units will not be operational until after 1992, they were not included in the capacity analysis for determining the need for a national variance.

B.3.4 Net Capacity at each DOE Facility

The estimates of mixed radioactive waste generation outlined above were compared to the available on-site treatment capacity to determine the net treatment capacity at each DOE facility for each treatment technology.

B.3.5 Net DOE Treatment Capacity

To determine the net DOE treatment capacity for each treatability group across all DOE facilities, aggregates of the quantities of wastes requiring a particular treatment were subtracted from the available capacity for that treatment.

B.4 Results of DOE Analysis

Analysis of the mixed radioactive waste generation data supplied by DOE shows that approximately 363 million gallons of radioactive waste mixed with First Third, Second Third, and Third Third RCRA wastes are affected by this proposed rule. A variety of waste types and RCRA waste codes are generated, and several treatability groups were identified. The results of the DOE data analysis are provided in a series of tables included in Attachment B-2 of this appendix. The following discussion outlines the major findings of the analysis and explains the Attachment B-2 tables in more detail.

The DOE data included 30 different First, Second, and Third Third RCRA waste codes. As Section B.3 discussed, the methodology used to analyze these data involved arranging the DOE wastes requiring the same BDAT into treatability groups. Tables B-2(a) through B-2(m) in Attachment B-2 provide facility-specific information on the volumes requiring treatment and the on-site treatment capacity for each treatability group. The on-site treatment capacity is based on treatment unit data provided by DOE for each site. In most cases, the capacity provided represents the "maximum" capacity of the unit. The "maximum" capacity is the capacity of the unit before subtracting any capacity currently being used. "Available" capacity refers to the amount of treatment capacity that a unit offers beyond any treatment that is currently taking place.

B.4.1 Stabilization

Table B-2(a) lists the on-site stabilization treatment capacity and the quantity requiring stabilization as treatment for each of the DOE facilities. Approximately 77.7 million gallons of DOE mixed radioactive wastes require stabilization treatment capacity. This volume accounts for approximately 46 percent of the non-soil and debris mixed radioactive wastes generated at DOE facilities that are affected by this proposed rule. EPA has determined that DOE mixed radioactive wastes requiring stabilization include those containing D005, D006, D007, D008, and D011 nonwastewaters.

EPA determined that 14.4 million gallons of DOE mixed radioactive wastes contain lead (D008). This quantity is about 8.5 percent of all non-soil and debris mixed radioactive wastes generated by DOE that are affected by this proposed rule.

- Based on brief waste descriptions, EPA determined that at least 155,000 gallons of solid lead generated by DOE require surface deactivation followed by encapsulation, which is discussed in Section B.4.2.

- EPA was unable to determine whether lead was in a solid, elemental form for 2.2 million gallons of mixed radioactive wastes and assigned this volume to the stabilization BDAT.

- EPA determined that 12 million gallons of mixed radioactive wastes containing lead do not fall into the new BDAT category. This volume was also assigned to stabilization.

A large amount of D009 (mercury) mixed radioactive wastes have been assigned to the stabilization treatability group. Although stabilization is not BDAT for D009 mixed radioactive wastes, a large amount of the D009 are within wastes that contain other metals for which stabilization is BDAT. Consequently the entire volumes of these streams were assigned to stabilization.

EPA determined, based on available data, that approximately 2.8 million gallons of stabilization capacity that is RCRA BDAT is available at DOE facilities. It appears, therefore, that a stabilization capacity shortfall exists for mixed radioactive wastes at DOE facilities.

B.4.2 Surface Deactivation Followed by Encapsulation

EPA currently assumes that LDR treatment standards and technologies that apply to non-radioactive hazardous waste also apply to the hazardous waste portion of mixed radioactive waste. In a few cases, however, EPA has determined that special treatment technologies may be required for mixed radioactive wastes because of the unique properties of the waste. One such case is solid lead (i.e., elemental lead) that has been radiologically contaminated. These wastes are commonly associated with lead shielding, "pigs," bricks, etc. EPA has determined that surface deactivation followed by encapsulation is BDAT for this waste. Analysis of the DOE data regarding lead wastes showed that at least 150,000 gallons of mixed radioactive wastes in the form of solid lead require this treatment, as shown in Table B-2(b).

DOE data indicated that solid lead mixed radioactive wastes were encapsulated at only one facility. The data, however, did not indicate that the waste first underwent surface deactivation at this facility. In addition, the DOE data did not identify any available capacity for this treatment. Even if BDAT treatment is being applied at that one facility, a capacity shortfall for surface deactivation followed by encapsulation currently exists at DOE facilities.

B.4.3 Combustion

Table B-2(c) provides the results of the analysis of DOE mixed radioactive wastes requiring combustion capacity. Data provided by DOE listed wastes containing the following waste codes that require combustion as treatment: D001, D012, D013, D014, D015, D016, D017, P068, U002, U019, U022, U213, U220, U226, and U239 wastewaters and nonwastewaters. In addition, volumes for wastes for which the waste codes were described only as "P's" and "U's" were assigned to the combustion treatability group.

Analysis of the DOE data showed that 1.6 million gallons of First Third, Second Third, and Third Third mixed radioactive wastes generated at DOE facilities require combustion capacity. This quantity is about one percent of the non-soil and debris mixed radioactive wastes generated at DOE facilities affected by this proposed rule.

On-site combustion capacity at DOE facilities is listed as zero gallons in all cases in Table B-2(c). Unlike the other tables, which list the "maximum" capacity for on-site treatment units, the combustion capacities listed in this table represent "available" capacity. Although DOE does have operational combustion facilities, EPA has assigned their capacity to mixed radioactive wastes other than those containing First Third, Second Third, or Third Third wastes. For the purposes of the capacity analysis for the Third Third proposed rule, therefore, available DOE combustion capacity for those radioactive mixed wastes affected by this proposed rule is zero.

B.4.4 Incineration with Ash Stabilization

EPA has determined that incineration with ash stabilization is BDAT for mixed radioactive wastes in the form of hydraulic oils containing mercury (D009). During analysis of the DOE data, the generation of these wastes could not be distinguished from the generation of other D009 mixed radioactive wastes. Specific generation numbers, therefore, could not be developed. No incineration/ash stabilization treatment capacity was identified, so a capacity shortfall for this technology currently exists at DOE facilities.

B.4.5 Neutralization

Table B-2(d) provides data mixed radioactive wastes requiring neutralization as treatment at DOE facilities. Mixed radioactive wastes exhibiting the characteristic of corrosivity (D002) were identified in the DOE data. These wastes require neutralization as BDAT. Analysis of the DOE data showed that 26.2 million gallons of DOE mixed radioactive wastes require neutralization. This quantity accounts for 15 percent of all non-soil and debris mixed radioactive wastes generated by DOE affected by this proposed rule.

The DOE data did not contain any specific capacity information for neutralization. The data, however, indicated that several D002-containing waste streams are currently being neutralized. In these cases, EPA has used the annual generation rate as the annual treatment capacity. Although this is an indirect method of estimating treatment capacity, this method does not affect the outcome of this capacity analysis. Even with the treatment capacities assigned in this way, a DOE capacity shortfall of nearly 26 million gallons was calculated.

B.4.6 Vitrification

Table B-2(e) addresses vitrification. DOE mixed radioactive wastes requiring vitrification include D004 and D010 nonwastewaters. These wastes are generated at four DOE facilities, in a combined amount of 28,000 gallons (less than 0.1 percent of all non-soil and debris mixed radioactive wastes generated at DOE facilities that are affected by this proposed rule).

Although the DOE data included information on planned vitrification facilities, no operational vitrification capacity was determined to be available. Thus, there is a DOE capacity shortfall for this technology.

B.4.7 Alkaline Chlorination

Table B-2(f) provides data on DOE mixed radioactive wastes that require alkaline chlorination. Approximately 800,000 gallons of non-explosive D003 wastes (reactive characteristic) were identified as requiring this treatment.

This quantity accounts for 0.5 percent of non-soil and debris DOE mixed radioactive wastes affected by this proposed rule.

No alkaline chlorination capacity is available at DOE facilities. Thus, there is a DOE capacity shortfall.

B.4.8 Treatment of Reactives

Table B-2(g) provides data on DOE mixed radioactive wastes requiring treatment of reactives. Analysis of DOE data identified explosive D003 wastes (reactive characteristic) in this category. These wastes were reported as generated at only one DOE facility, which indicated that 5,000 gallons require treatment. No treatment of reactives capacity was identified during the analysis. Thus, there is a DOE capacity shortfall this technology.

B.4.9 Chemical Precipitation

Table B-2(h) provides data on DOE mixed radioactive wastes requiring chemical precipitation. Approximately 12,000 gallons of mixed radioactive wastes require chemical precipitation capacity, including D004, D005, D006, D008, D009, D010, and D011 wastewaters.

No chemical precipitation treatment capacity was identified in the analysis of DOE data. There is a capacity shortfall for chemical precipitation currently exists at DOE facilities.

B.4.10 Sulfide Precipitation

Sulfide precipitation is BDAT for mixed radioactive wastes containing mercury (D009). Table B-2(i) provides information on D009 mixed radioactive wastewaters at DOE facilities. Approximately 51.6 million gallons of D009 mixed radioactive wastes were identified, accounting for approximately 30 percent of all non-soil and debris DOE mixed radioactive wastes. No sulfide precipitation treatment capacity was identified, so a DOE capacity shortfall currently exists.

B.4.11 Amalgamation with Zinc

Based on DOE data, EPA has determined that amalgamation with zinc is BDAT treatment for mixed radioactive wastes containing elemental mercury (D009 or U151). It was difficult to determine, from the DOE data, the quantity of DOE wastes that require this treatment. Table B-2(j) provides information on streams that could be identified.

Amalgamation with zinc treatment capacity was not identified in the DOE data, so a DOE shortfall in capacity currently exists.

B.4.12 Metals Recovery

Table B-2(k) provides data on DOE mixed radioactive wastes requiring metals recovery as treatment. Approximately 200,000 gallons of P015 wastes (beryllium dust) require metals recovery treatment at DOE facilities. This figure accounts for less than one percent of all non-soil and debris DOE mixed radioactive wastes affected by this proposed rule.

EPA's analysis of DOE data identified no metals recovery capacity. Therefore, there is a capacity shortfall for this technology.

B.4.13 Chromium Reduction followed by Chemical Precipitation

Table B-2(l) provides data on DOE mixed radioactive wastes for which chromium reduction followed by chemical precipitation is the required treatment. Analysis of the DOE data identified 1,650 gallons of D007 wastewaters as the only DOE mixed radioactive wastes requiring this treatment. This waste was generated at only one facility. The analysis, however, identified no chromium reduction or chemical precipitation treatment capacity. Thus, there is a DOE capacity shortfall for chromium reduction followed by chemical precipitation.

B.4.14 Alkaline Chlorination Followed by Chemical Precipitation

Table B-2(m) provides data on DOE mixed radioactive wastes for which alkaline chlorination followed by chemical precipitation is the required treatment. The following DOE wastes require this treatment: F006 wastewaters and F007, F008, and F009 nonwastewaters and wastewaters. Approximately 500,000 gallons of mixed radioactive wastes require this treatment. This volume accounts for approximately 0.3 percent of the non-soil and debris DOE mixed radioactive wastes affected by this proposed rule.

No alkaline chlorination or chemical precipitation treatment capacity is available at DOE facilities. Consequently, there is a capacity shortfall for this technology.

B.4.15 Alkaline Chlorination Followed by Stabilization of Metals

Alkaline chlorination followed by stabilization of metals is BDAT for mixed radioactive wastes containing F006 nonwastewaters. Table B-2(n) provides information on these wastes, and shows that 8 million gallons are generated at DOE facilities. This quantity accounts for 5 percent of all non-soil and debris DOE mixed radioactive wastes affected by this propose rule. No capacity for this treatment was identified, so there is currently a DOE capacity shortfall for alkaline chlorination followed by stabilization of metals.

B.4.16 Soil and Debris

Through analysis of DOE data, EPA has determined that there are 193 million gallons of soil and debris contaminated with mixed radioactive waste at DOE facilities. This volume accounts for 53 percent of all DOE mixed radioactive wastes that may be affected by this proposed rule. Table B-2(o) provides information on these soil and debris wastes.

Over 98 percent of the soil and debris volume contains "unknown" or "various" RCRA hazardous wastes. The types of RCRA hazardous wastes listed for the less than two percent that were characterized included D006, D008, D009, and D011. One facility listed almost three million gallons of soil and debris contaminated with D008.

There is no DOE treatment capacity for soil and debris contaminated with mixed radioactive wastes.

B.4.17 Other DOE Wastes

Several wastes identified within the DOE data could not be placed in a particular treatability group. These "other" wastes amounted to 3.3 million gallons, or one percent of all DOE mixed radioactive wastes affected by this proposed rule. Approximately 87,000 gallons of these miscellaneous wastes listed "various" or "unknown" waste codes, and could not be classified in any particular treatability group. Two wastes, amounting to 3,210,030 gallons, were classified as containing "D's," "P's," and "U's." Approximately 2.3 million gallons of this total was identified as high-level fuel process wastes. The other one million gallons were designated as calcinated wastes. Because of the incomplete classification of these wastes and their unique physical form, these mixed radioactive wastes were not assigned to a particular treatability group. Excluding these wastes from the analysis does not affect the need for a variance, as these volumes would only add to the capacity shortfalls that have already been identified.

B.4.18 DOE Planned Treatment Capacity

Although there are currently DOE capacity shortfalls for all treatability groups, a considerable number of treatment units are either planned or under construction at DOE facilities. When operational, these units will provide significant treatment capacity for a number of treatability groups. Because these units will not be available in May 1990, however, they were not considered in the Third Third capacity analysis.

At least 20 different treatment units are expected to come on line at DOE facilities between 1992 and 2012. These units will include several incinerators (including controlled air, rotary kiln, and plasma arc), solidification units, vitrification and glass/ceramic process units, grout operations (some with pre-processing such as sorting and shredding), and other treatment units such as evaporators and leaching systems. These treatment units will provide significant treatment capacity for mixed radioactive wastes generated at DOE facilities in the future.

B.5 Analysis of Non-DOE Mixed Radioactive Waste Generation

Several types of non-DOE facilities generate mixed radioactive wastes. In this analysis, EPA used the best available information on the quantities and characteristics of mixed radioactive wastes generated at non-DOE facilities. Information used for this capacity analysis include data developed as part of EPA's Generator Survey, state and interstate compact surveys and reports, a study developed for the Office of Technology Assessment of the U.S. Congress, a study developed for the Nuclear Management Resources Council, and a series of reports developed by Brookhaven National Laboratory for the Nuclear Regulatory Commission. These data sources vary in detail and none of them provide national estimates of non-DOE mixed radioactive waste generation.

To derive non-DOE mixed radioactive waste generation information that could be compared or combined with DOE data to determine the total demand for alternative capacity, EPA had to develop:

(1) Rough estimates of the quantities of non-DOE mixed radioactive wastes generated; and
(2) The types of RCRA hazardous waste codes found in these wastes.

Ideally, the non-DOE mixed radioactive waste generation rates would be linked to specific RCRA waste codes. With this level of detail, EPA could allocate non-DOE mixed radioactive wastes to treatability groups and combine this information with similar data for DOE facilities. In analyzing the available information, however, EPA found that, in most cases, the information characterizing non-DOE mixed radioactive wastes was not sufficiently detailed to perform such an analysis. As described below, several data sources list "mixed waste" as a single category, while others provide a single, overall generation rate while listing several potential hazardous contaminants. Thus, in many cases, EPA could not directly calculate generation rates by RCRA waste code.

The following discussion outlines the most relevant information. Attachment B-1 provides complete citations for these data sources. The volume analysis and characterization of these wastes were performed simultaneously, as these pieces of information were usually presented together.

EPA's Survey of Hazardous Waste Generators provided limited data on the quantities of mixed radioactive wastes generated in 1986. It did not, however, provide generation information by RCRA waste code. The available Generator Survey information identifies 47 facilities that reported generating mixed radioactive wastes. Nine of these were DOE facilities, which were not considered in the non-DOE analysis. The remaining 38 facilities were universities, medical institutions, industrial facilities, and waste processors. These non-DOE facilities reported generating a total of 307,626 gallons of mixed radioactive waste. An unknown portion of these wastes are subject to this Third Third proposed rule.

The 1987 Annual Survey Report developed by the State of Illinois Department of Nuclear Safety included information on two categories of mixed radioactive wastes:

(1) Liquid scintillation fluids. The report indicates that Illinois generators shipped 1,444 cubic feet (10,776 gallons) of liquid scintillation fluids. How these shipped wastes were managed is discussed in Section B.6.

(2) "Hazardous chemicals." The report indicated that a total of 1,762 cubic feet (about 13,149 gallons) of hazardous chemicals is being stored by Illinois generators due to technical or regulatory concerns. The report states that "hazardous chemicals" may be mixed radioactive wastes. No characterization data were available beyond this classification. In addition, one generator indicated that 53,774 cubic feet (401,299) gallons) of radioactive waste contaminated with hazardous chemicals were being stored for future shipment or alternative treatment.

In addition to the 1987 Illinois report, EPA analyzed information from the 1988 Illinois LLW Generator Survey. This survey reported that 2,774.3 cubic feet (20,704 gallons) of mixed radioactive wastes were being stored due to technical or regulatory constraints on disposal. A total of 2,372.2 cubic feet (17,705 gallons) or about 85 percent of all mixed radioactive wastes in this section of the survey were contaminated with RCRA solvents, for which land disposal restrictions are already in place. Only 3,000 gallons of the total, therefore, are affected by this Third Third proposed rule. Potential RCRA hazardous wastes found in these mixed radioactive wastes included scintillation fluids (potentially D001), acidic liquids (potentially D002), and lead (potentially D008).

The Northwest Interstate Compact on Low-Level Radioactive Waste Management performed surveys in 1988 and 1989 to obtain information on mixed radioactive wastes. The 1988 survey indicated an annual mixed radioactive waste generation rate of 16,173.5 cubic feet (120,698 gallons) for states in the Compact. Of this total, 15,000 cubic feet (111,940 gallons) were reported as one-time generation by a single generator. The 1989 survey indicated an annual generation rate of 184 cubic feet (1,373 gallons). Discounting the 15,000 cubic feet generated at the one facility in 1988, the total amount generated fell by over 80 percent between the 1988 and 1989 surveys.

The Northwest Compact report identified the following potential First Third, Second Third, and Third Third mixed radioactive wastes:

- Chromium waste (potentially D006);
- Lead mixtures (potentially D008);
- Organic corrosives (potentially D002);
- Scintillation fluids (potentially D001); and
- Exchange resins (potentially contain EP toxicity metals).

An informal LLW report by the Massachusetts Association of Radioactive Waste Generators (cited in Jennrich, March 1989) reports that Massachusetts annually generates 2932 cubic feet (21,881 gallons) of scintillation materials, which are potentially affected by this Third Third proposed rule.

The 1988 Connecticut Low-Level Waste Management Plan also contains some information on mixed radioactive wastes. The 1987 Survey reported the in-state generation of 1906.4 cubic feet (14,277 gallons) of liquid scintillation wastes and approximately 20 gallons of lead-contaminated mixed radioactive wastes.

The 1986 Generator Survey conducted by the Northeast Interstate Low Level Radioactive Waste Commission indicated that mixed radioactive wastes constitute four percent of the regional waste stream. The report stated that 4,757 cubic feet (35,500 gallons) were shipped from the region for disposal.

New York and the Midwest Compact surveys addressed mixed radioactive waste generation that would occur during or after 1993. New York generators indicated that 4,535 cubic feet (32,488 gallons) of mixed radioactive waste would be generated in 1993. The Midwest Compact states indicated that 8,372 cubic feet (62,477 gallons) would be generated between January 1993 and December 1995, which is slightly more than 20,000 gallons per year.

The above discussion outlines the best available data from the state and interstate compact surveys and reports. Additional surveys were analyzed (see Attachment B-1), but the information included in those documents was of limited use in this capacity analysis.

In addition to the survey data discussed above, EPA also evaluated information provided in two summary reports, one performed for the Office of Technical Assessment of the U.S. Congress (Jennrich, March, 1989, referred to as the OTA report) and the other for the Nuclear Management and Resource Council (Jennrich, June 1989, referred to as the NUMARC report) The reports were useful in identifying the types of wastes generated at non-DOE facilities. Both reports, however, indicated that the data included do not represent national estimates of national mixed radioactive waste generation.

The OTA report, which included information from the NUMARC report, develop seven groups of mixed radioactive wastes based on the hazardous constituents involved:

- Liquid scintillation cocktails or fluids;
- Organic chemicals/trash;
- Lead and lead decontamination solutions;
- Waste oil/oily trash;
- CFC/CFC concentrates;
- Aqueous corrosive liquids; and
- Chromate/cadmium wastes.

Of these seven, only four are potentially affected by this proposed rule: liquid scintillation fluids are potentially D001 wastes; lead and lead decontamination solutions are potentially D008; aqueous corrosive liquids are potentially D002; and chromates and cadmium are potentially D007 and D006, respectively. The other three categories are either not currently RCRA hazardous wastes (waste oil) or are wastes for which the LDRs currently are already in effect (solvents).

In addition to the four categories listed above, investigation of the NUMARC report also identified reactive chemicals as potential D003 mixed radioactive wastes. Information on the quantities of these wastes generated, however, were not available.

In an effort to roughly estimate the non-DOE mixed radioactive waste generated annually, EPA used an analysis of mixed radioactive wastes performed by Brookhaven National Laboratory for the Nuclear Regulatory Commission which indicated that approximately three percent of all low-level radioactive wastes are potentially contaminated with RCRA hazardous wastes. Applying this percentage to the approximately 13.4 million gallons of LLW generated in 1986 (Jennrich, March 1989), roughly 400,000 gallons of mixed radioactive wastes were generated in that year.

Although this figure provides an approximation of the amount of non-DOE mixed radioactive wastes generated annually, several other factors had to be considered during the analysis of non-DOE mixed radioactive waste generation in support of this proposed rule. First, this figure accounts for all mixed radioactive wastes, including solvents, dioxins, and California list wastes, for which land disposal restrictions are already in place. EPA has determined that the mixed radioactive wastes already subject to the LDRs constitute a significant portion of all non-DOE mixed radioactive wastes.

A second factor that is not reflected in the approximation is the quantity of mixed radioactive wastes in storage at non-DOE facilities. If untreated, these wastes constitute a demand for treatment capacity. EPA's review of available information sources indicates that there are significant quantities of mixed radioactive wastes in storage at non-DOE facilities.

As a result of the analysis of available information on the generation of non-DOE mixed radioactive wastes, EPA has reached several conclusions:

(1) There is a lack of quantifiable information on the generation and management of mixed radioactive wastes at non-DOE facilities. EPA has based this analysis on what it

considers to be the best information available. EPA recognizes, however, that these information sources are both limited in content and limited to only a sample of the total non-DOE mixed radioactive waste universe. In this proposed rule, the Agency solicits any additional information on the generation and management of non-DOE mixed radioactive wastes.

(2) The volumes of mixed radioactive wastes generated at non-DOE facilities are relatively small compared to those generated at DOE facilities. The rough estimate of 400,000 gallons of mixed radioactive wastes generated annually (based on the Brookhaven estimate that three percent of all LLW is also mixed radioactive waste) is known to include mixed radioactive wastes that are not affected by this proposed rule. EPA has determined, however, that significant quantities of mixed radioactive wastes are in storage at non-DOE facilities requiring treatment. Even if the actual quantity of mixed radioactive wastes was five times the 400,000 gallon estimate, this quantity would still be less than one percent of the DOE-generated mixed radioactive wastes that are affected by this proposed rule. Non-DOE mixed radioactive wastes, therefore, are expected to have no significant impact on the capacity analysis performed on mixed radioactive wastes at DOE facilities.

(3) The types of mixed radioactive wastes generated at non-DOE facilities are also generated at DOE facilities. Upon analysis of available non-DOE information, no additional RCRA waste codes were identified that were not already identified in the DOE data. Non-DOE mixed radioactive waste types, therefore, are not expected to affect the capacity analysis performed on the DOE data (i.e., no additional treatability groups for mixed radioactive wastes had to be established).

B.6 Analysis of Non-DOE Treatment Capacity

EPA has taken several steps to identify available non-DOE treatment capacity for mixed radioactive wastes. In support of the capacity analysis for the First Third Rule, EPA analyzed information from the 1986 Survey of Hazardous Waste Treatment, Storage, Disposal and Recovery Facilities (TSDR Survey). EPA's review of process-specific TSDR Survey questionnaire responses identified no existing or planned commercial treatment, recovery, or disposal systems for mixed radioactive wastes. To supplement information in the TSDR Survey, EPA investigated several other sources of information, which were discussed in section B.5. As described below, the various sources generally indicated that a shortfall of available treatment capacity for mixed radioactive wastes exists around the nation.

B.6.1 Identification of non-DOE Treatment Capacity

In order to identify available non-DOE treatment capacity, EPA investigated available non-DOE information to determine how the different types of mixed radioactive wastes are currently managed.

One of the primary types of mixed radioactive wastes affected by this proposed rule is scintillation waste. Scintillation fluids usually meet the RCRA ignitability characteristic (D001) and are therefore Third Thirds wastes. Combustion is the BDAT technology for D001 wastes. Investigation of the TSDR Survey identified no RCRA-permitted combustion facilities that accept mixed radioactive wastes. Because many scintillation fluids contain radionuclides with relatively short half-lives, EPA believes that a large amount of these materials are stored for decay and then managed as non-radioactive hazardous wastes. This conclusion is based on information in the OTA report, and is supported by several of the state and interstate reports. Although the scintillation fluids, such as toluene and xylene, may eventually be incinerated as non-radioactive wastes, no combustion facilities handling mixed radioactive wastes have been identified.

Analysis of the state and interstate reports and other data sources identified no available treatment capacity for any other RCRA mixed radioactive wastes subject to the Third Thirds proposed rule. The data sources contained evidence of capacity shortfalls, as discussed below.

The 1987 Illinois LLW Annual Survey Report indicated that every LLW generator possessing "hazardous chemicals" reported storing these wastes. Although data characterizing these wastes were not available, EPA assumed that "hazardous chemicals" may contain First Third, Second Third, or Third Third RCRA wastes. Generators reported storing at least 400,000 gallons of potential mixed radioactive wastes because of regulatory or technical constraints or for future shipment or alternative management. None of these wastes are currently being treated.

The 1989 Northwest Compact Region Survey, the 1988 Connecticut Low-Level Radioactive Waste Management Plan, the Northeast Interstate Low-Level Radioactive Waste Commission's Regional Waste Management Plan (August 1989), and the Pennsylvania/Appalachian States Compact Low-Level Waste Management Survey (1987) also indicate a lack of available treatment capacity for mixed radioactive wastes. The Northeast Interstate Low-Level Radioactive Waste Commission's Regional Waste Management Plan, for example, indicated that mixed radioactive waste generators are concerned about the storage limitations imposed by the land disposal restrictions because there are no disposal or treatment facilities within the Compact region.

The OTA report, which incorporates data from the state and interstate surveys, the NUMARC report, and an informal survey of generators, processors, and brokers, also did not identify significant treatment capacity for First Third, Second Third, or Third Third wastes.

- The OTA report noted that the majority of contaminated solid and elemental lead (potentially D008) is currently stored. The report did indicate that some lead decontamination solutions are currently being solidified, which could represent BDAT if determined not to be EP Toxic for lead. EPA, however, has not identified any non-DOE stabilization capacity. The Agency welcomes any information on stabilization capacity for D008 wastes.

- The OTA report also stated that aqueous corrosive liquids, which are potentially D002 mixed radioactive wastes, are currently being stored in lieu of any ongoing treatment. EPA has not identified any non-DOE neutralization capacity for D002 wastes.

- Chromate and cadmium wastes are the only remaining potential Third Third mixed radioactive wastes identified in the OTA report. No available treatment capacity for chromate- or cadmium-containing mixed radioactive wastes was identified in the reports. (These wastes are potentially D006 and D007 mixed radioactive wastes. According to the NUMARC report, nuclear power plants are potential generators of these wastes. These wastes, however, were not reported as mixed radioactive wastes in any of the other information sources.)

In an effort to identify additional data sources that might contain information on mixed radioactive waste treatment capacity, EPA contacted mixed radioactive waste experts associated with federal, state, and interstate organizations. Attachment B-3 to this appendix describes these phone contacts. These individuals were asked to identify any relevant data sources on the generation of and treatment or recovery capacity for mixed radioactive wastes. All information sources that were obtained as a result of these conversations are listed in Attachment B-1 and were incorporated into this analysis. A majority of the individuals contacted indicated that they knew of no available commercial treatment or recovery capacity for mixed radioactive wastes. Other respondents, however, identified four existing and one planned facility that they thought may be treating mixed radioactive wastes. Upon reinvestigation of the TSDR data set, EPA concluded that none of these facilities have BDAT treatment capacity that affect the capacity analysis for the Third Third proposed rule.

B.6.2 Summary of Non-DOE Treatment Capacity

EPA believes that the information developed for this capacity analysis constitutes the best available data on the generation and treatment of mixed radioactive wastes at non-DOE facilities. EPA recognizes that the information on non-DOE facilities is limited and the proposed rule solicits comments by interested parties on the generation and management of non-DOE mixed radioactive wastes.

EPA has not identified any non-DOE treatment capacity for non-DOE mixed radioactive wastes affected by this proposed rule:

- Combustion is the BDAT for D001 wastes which may be found in scintillation fluids. No non-DOE combustion capacity was identified in this capacity analysis.

- Stabilization is the BDAT for D006 (cadmium), D007 (chromium), and most D008 (lead) nonwastewaters. No non-DOE stabilization capacity was identified in this capacity analysis.

- Surface Decontamination followed by Encapsulation is the BDAT for solid (i.e., elemental) lead (D008). This BDAT is unique to solid lead mixed radioactive wastes, which are often in the form of shielding, lead "pigs," or bricks. These waste are known to be generated at non-DOE facilities. No surface contamination/encapsulation treatment capacity, however, was identified in this analysis.

- Chemical Precipitation is the BDAT for D006 and D008 wastewaters. No non-DOE chemical precipitation capacity was identified.

- Chromium Reduction followed by Chemical Precipitation is the BDAT for D007 (chromium) wastewaters. No non-DOE chromium reduction followed by chemical precipitation treatment capacity was identified in this analysis.

- Neutralization is the BDAT for D006 and D008 wastewaters. No non-DOE neutralization treatment capacity was identified in this capacity analysis.

In addition to the treatability groups discussed above, EPA has identified two other treatment technologies that are unique to mixed radioactive wastes -- amalgamation with zinc (for elemental mercury) and incineration with ash stabilization (for hydraulic oils containing mercury) -- which were discussed in sections B.4.4 and B.4.10. No non-DOE treatment capacity for these technologies was identified.

Although no additional First Third, Second Third, or Third Third waste codes have been identified specifically, a large amount of uncharacterized mixed radioactive wastes are generated at non-DOE facilities (See Section B.5.) These uncharacterized mixed radioactive wastes may contain RCRA waste codes not identified above. Because no RCRA treatment capacity is available for mixed radioactive wastes other than scintillation fluids, any generation of First Third, Second Third, or Third Third wastes not identified here would face a capacity shortfall.

B.7 National Capacity Variance for Mixed Radioactive Wastes

Based on the analysis discussed above, EPA has determined that there is currently insufficient BDAT or equivalent treatment capacity for mixed radioactive wastes at both DOE and non-DOE facilities. Because a treatment capacity shortfall was identified for every mixed radioactive waste treatability group, EPA is proposing to grant a national capacity variance for all mixed radioactive wastes. The waste codes that have been identified in this analysis are arranged in treatability groups according to BDAT or the equivalent in Table B.1, which also summarizes the treatment capacity shortfalls.

Table B.1
Summary of National Capacity Variance for Mixed Radioactive Waste
(millions of gallons/year)

BDAT or EQUIVALENT	RCRA WASTE CODE(S)	QUANTITY REQUIRING TREATMENT	MAXIMUM TREATMENT
Stabilization	D005 nonwastewaters D006 nonwastewaters D007 nonwastewaters D008 nonwastewaters D011 nonwastewaters	77.7	2.8
Surface Deactivation Followed by Encapsulation	D008 (solid)	0.2	0
Combustion	D001 P068 D012 U002 D013 U019 D014 U022 D015 U213 D016 U220 D017 U226 U239	1.6	0*
Incineration Followed by Ash Stabilization	D009 (hydraulic oils)	<0.1	0
Neutralization	D002	26.2	0.2
Vitrification	D004 nonwastewaters D010 nonwastewaters	<0.1	0
Alkaline Chlorination	D003	0.8	0
Treatment of Reactives	D003	<0.1	0
Chemical Precipitation	D004 wastewaters D005 wastewaters D006 wastewaters D008 wastewaters D010 wastewaters D011 wastewaters	<0.1	0
Sulfide Precipitation	D009	51.6	0
Amalgamation with Zinc	D009 (elemental)	<0.1	0
Metals Recovery	P015	0.2	0
Chromium Reduction Followed by Chemical Precipitation	D007 wastewaters	<0.1	0
Alkaline Chlorination Followed by Chemical Precipitation	F007 F008 F009 F006 wastewaters	0.5	0
Alkaline Chlorination Followed by Stabilization of Metals	F006 nonwastewaters	8.1	0
Soil and Debris	various	193	0
Other	various/unknown	3.3	0

* Combustion capacity expressed in terms of "available" capacity.

No information was available for mixed radioactive wastes that are disposed of in deep wells. For this reason, EPA is not proposing to grant a national capacity variance for these wastes.

B.8 Information and Data Limitations

EPA recognizes that its information on mixed radioactive wastes generated and managed by non-DOE facilities may be incomplete. Consequently, the Agency welcomes comments by interested parties on the current generation of mixed radioactive wastes.

ATTACHMENT B-1

SOURCES OF INFORMATION ON NON-DOE MIXED RADIOACTIVE WASTES

This attachment describes the sources of information on non-DOE wastes gathered and analyzed by EPA as part of the capacity analysis. The attachment is organized in the following sections: EPA national surveys, overview reports, state and interstate compact surveys and reports, and telephone contacts.

NATIONAL SURVEYS

In an effort to develop information on the universe of hazardous waste management in the United States, EPA developed two comprehensive national surveys.

TSDR Survey

The General Facility Information questionnaire requested information on types and commercial status of mixed radioactive waste management, volumes treated in 1986, the maximum quantity of mixed radioactive wastes that could have been treated in 1986, and when treatment would discontinue at each facility. No specific waste code or waste stream information was requested, but some waste codes were determined through the use of facility notes and facility contacts. The TSDR survey was used to identify any operating facilities that treat or recover mixed radioactive wastes, and to investigate operations at facilities that could potentially handle mixed radioactive wastes.

Generator Survey

The Generator Survey Questionnaires contain very general references to mixed radioactive wastes. Specifically, Questionnaire GA (General Facility Information) asks three basic questions: (1) Did the facility generate mixed radioactive wastes on-site; (2) What quantity was generated; and (3) How are these mixed radioactive wastes managed. Although the Generator Survey data set is currently incomplete, only 47 facilities have been identified as indicating that they generate mixed radioactive wastes. Several of these were DOE facilities and several were research universities. Although these facilities reported mixed radioactive waste generation quantities, EPA is of the opinion that these facilities represent only a small sample of the mixed radioactive waste-generating community. This conclusion is based on information contained in the overview reports listed below, which indicate that hundreds of facilities are potential generators of mixed radioactive wastes. For example, over 100 nuclear power plants are potential generators of mixed radioactive wastes. Use of information in the Generator Survey is discussed within the text of this appendix.

OVERVIEW REPORTS

In response to increased concern over the responsible management of mixed radioactive wastes, several national trade associations and government agencies undertook studies to examine the generation and management of mixed radioactive wastes. These studies are outlined below.

- Jennrich, E.A., Rogers and Associates Engineering Corporation, Management Practices and Disposal Concepts for Low-Level Radioactive Mixed Waste, Congress of the United States, Office of Technology Assessment, Washington, D.C., March 1989.

  This report is perhaps the most comprehensive analysis of low-level mixed radioactive wastes completed to date. It identifies generators, processes, and RCRA hazardous wastes. The report, however, provides no national estimates of mixed radioactive waste generation. The data were developed through reviewing existing information, contacting national associations, and where necessary, surveying a sample of LLW generators, processors, and brokers. The purpose of the study was to identify current management practices and to develop a common understanding of mixed radioactive waste management system performance goals and disposal system design features. The information in this document was useful for identifying processes and management practices at non-DOE facilities. Generation rate information was also useful for determining the relative magnitudes of different types of mixed radioactive wastes generated at the various types of facilities.

- Jennrich, E.A., Rogers and Associates Engineering Corporation, The Management of Mixed Waste in the Nuclear Power Industry, prepared for Nuclear Management and Resources Council (NUMARC), Washington, D.C., June, 1989.

  This analysis provided conservative (i.e., upper bound) estimates of mixed radioactive waste generation at nuclear power plants. The document carefully notes that its estimates of mixed radioactive waste generation at a typical nuclear power plant should not be seen as definitive. The value of the information presented in this report is not so much in the magnitude of mixed waste volumes as it is in identifying processes that potentially produce mixed wastes.

- Brookhaven National Laboratory, Analysis of Low-Level Wastes: Review of Hazardous Waste Regulations and Identification of Radioactive Mixed Wastes, Final Report; study prepared for the Nuclear Regulatory Commission, Washington, D.C., December 1985.

  This report examines the identification and management of low-level radioactive mixed wastes. Brookhaven developed the data by reviewing existing data and surveying several of the largest LLW generators. Wastes of potential concern that were analyzed include: Liquid scintillation wastes, spent organic solvents, lead metal, and chromate-containing wastes.

Weaknesses in the Brookhaven information for purposes of the Third Third capacity analysis include a lack of detailed waste characterization and problems associated with using a representative sample -- no national estimates of specific mixed radioactive waste quantities were developed.

In terms of the capacity analysis, the information in these documents was useful primarily in targeting processes and waste codes of concern to be analyzed in more detail.

- EPA, Mixed Energy Waste Study (MEWS), Office of Solid Waste, Washington, D.C., 20640, March 1987.

This report summarizes the findings of EPA's MEWS Task Force which investigated DOE's management of HLW and TRU wastes in order to compare the practices to requirements for hazardous waste management under RCRA Subtitle C. This report was used to identify some of the types of mixed radioactive wastes that are generated at DOE facilities prior to investigation of the data provided by DOE.

STATE AND INTERSTATE COMPACT SURVEYS AND REPORTS

The following state and interstate compact surveys and reports were evaluated during this capacity analysis:

Carlin, Elaine, Mixed Waste in Washington and the Northwest Compact Region: Problem Definition, Timelines, and Management Options, Low-Level Radioactive Waste Program, Department of Ecology, State of Washington, 1989.

Carlin, Elaine, Mixed Waste Management in Washington and the Northwest Compact Region, Low-Level Radioactive Waste Program, Department of Ecology, State of Washington, 1988.

Connecticut Hazardous Waste Management Service, 1988 Connecticut Low-Level Radioactive Waste Management Plan, December 1988.

Illinois Department of Nuclear Safety. 1987 Annual Survey Report, May 1989.

Illinois Department of Nuclear Safety, 1988 LLW Generator Survey, (data set on facilities storing mixed radioactive wastes due to regulatory or technical constraints on disposal)

New York State Energy Research and Development Authority, 1988 New York State Low-Level Radioactive Waste Status Report, June 1989.

Northeast Interstate Low-Level Radioactive Waste Commission, Regional Management Plan Update, August 1989.

Northwest Interstate Compact on Low-Level Radioactive Waste Management, Options for Mixed Waste Management, Discussion Paper, April 1989 (revised).

Pennsylvania Department of Environmental Management, Appalachian States Compact Low-Level Radioactive Waste Management Survey - 1987, 1988.

Pennsylvania Department of Environmental Management, Pennsylvania and Maryland Low-Level Radioactive Waste Management Survey - 1986, October 1987.

Southeast Compact Commission, 1987 Summary of Low-Level Radioactive Waste Management in the Southeast Compact, 1988.

TELEPHONE CONTACTS

In an effort to identify more information sources, data, or reports, several state, regional, and federal officials were contacted by telephone. These groups included the following:

Afton & Associates (Management Consultants of Working Group for Central Compact Commission). Contact: Edgar Miller.

Central Compact Commission, Lincoln, NE. Contact: Jay Ringenberg

Commonwealth of Pennsylvania, Department of Environmental Resources, Bureau of Radiation Protection, Division of Nuclear Safety, 200 N. Third Street, Fulton Bldg., 16th Fl., P.O. Box 2063, Harrisburg, PA 17120. Contact: Kenneth Singh.

Congress of the United States, Office of Technology Assessment, Washington, D.C. Contact: Gretchen McCabe.

Connecticut Hazardous Waste Management Service, Suite 360, 900 Asylum Ave., Hartford, CT 06105-1904. Contact: Meg Harvey.

Envirosphere (consultant for Southwest Compact), WA. Contacts: Tim Gould and Nancy Kerner.

Illinois Department of Nuclear Safety, 1035 Outer Park Dr., Springfield, IL 62704. Contact: Melissa Young.

Midwest Low-Level Radioactive Waste Commission, 350 No. Robert St., Room 588, St. Paul, MN 55101. Contact: Susan Olsson, Assistant to the Director.

Nevada State Division of Health, Carson City, NV. Contact: John Vaden.

New York State Energy Research and Development Authority, Communications Dept., Two Rockefeller Plaza, Albany, NY 12223. Contact: Ann Constantino.

Nuclear Regulatory Commission--Washington State, Olympia, WA. Contacts: Toby Michelina and Stephanie Ko, Low-Level Waste Management Group.

Principaled Negotiations Inc., Amherst, NH. Contact: Arnie Wight.

Rocky Mountain Compact Commission, Denver, CO. Contact: Karen Salzer.

Rogers and Associates Engineering Corp., UT. Contact: Ed Jennrich.

South Carolina Dept. of Health and Environmental Control, Office of Radiological Health, Waste Division. Contact: Vergil Autry.

Southeast Compact Commission for Low-Level Radioactive Waste Management, 3901 Barrett Dr., Suite 100, Raleigh, NC 27609. Contact: Kathryn Visocki.

Southwest Compact Commission, Sacramento, CA. Contacts: Reuben Junkert, Dept. of Health Services and Russ Huck.

State of Washington, Department of Ecology, Mail Stop PV-11, Olympia, WA. Contacts: Sarah Hana, Radiation Health Physicist, LLRW Management Program and Earl Liverman and Roger Stanley.

State of Washington Department of Health. Contacts: Gary Robeson and Mike Elsen.

ATTACHMENT B-2

TECHNOLOGY-BASED SUMMARIES OF DOE MIXED RADIOACTIVE WASTE GENERATION AND TREATMENT CAPACITY

TABLE B-2(a)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT/TREATMENT TECHNOLOGY = STABILIZATION *****

Affected waste codes: D005 nonwastewaters
D006 nonwastewaters
D007 nonwastewaters
D008 nonwastewaters
D011 nonwastewaters
F006 nonwastewaters

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	275
ARGONNE NATIONAL LAB - W	0	153
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	37,648
HANFORD	0	44,942,197
IDAHO NATIONAL ENGINEERING LAB	680,050	5,277,851
ITRI	0	705
KANSAS CITY	0	55
LIVERMORE - SNL	0	67
LOS ALAMOS NATIONAL LAB	0	193,967
MOUND	0	978
NEVADA TEST SITE	0	79
OAK RIDGE NATIONAL LAB	1,518,093	1,694,546
PANTEX	0	6,782
PINELLAS	0	2,114
ROCKY FLATS	121,737	125,186
SANDIA NATIONAL LAB	0	22,215
SAN - LLNL	0	656
SAVANNAH RIVER	0	25,379,605
WEST VALLEY	444,120	0
TOTALS:	2,764,000	77,685,079

*** NET STABILIZATION CAPACITY: (77,685,079)

* SAN/LLNL and Savannah River have stabilization treatment units, but they have not been determined to be RCRA BDATs

TABLE B-2(b)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT/TREATMENT TECHNOLOGY = SURFACE DEACTIVATION FOLLOWED BY ENCAPSULATION *****

Affected waste codes: D008 solid

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	0
ARGONNE NATIONAL LAB - W	0	214
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	0
HANFORD	0	74,504
IDAHO NATIONAL ENGINEERING LAB	0	21,136
ITRI	0	54
KANSAS CITY	0	120
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	0
PANTEX	0	3,140
PINELLAS	0	0
ROCKY FLATS	0	7,537
SANDIA NATIONAL LAB	0	0
SAN - LLNL	0	117
SAVANNAH RIVER	0	48,600
WEST VALLEY	0	0
TOTALS:	0	155,422

*** NET STABILIZATION CAPACITY: (155,422)

TABLE B-2(c)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT TREATMENT TECHNOLOGY = COMBUSTION *****

Affected waste codes:
D001
P068
U002
U019
U022
U213
U220
U226
U239
D012
D013
D014
D015
D016
D017

FACILITY	AVAILABLE ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	9,200
ARGONNE NATIONAL LAB - W	0	0
BROOKHAVEN NATIONAL LAB	0	300
FMPC	0	0
HANFORD	0	9,872
IDAHO NATIONAL ENGINEERING LAB	0	1,557,448
ITRI	0	6,517
KANSAS CITY	0	0
LIVERMORE - SNL	0	317
LOS ALAMOS NATIONAL LAB	0	4,529
MOUND	0	10,964
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	17,701
PANTEX	0	3,764
PINELLAS	0	0
ROCKY FLATS	0	0
SANDIA NATIONAL LAB	0	4,522
SAN - LLNL	0	11,018
SAVANNAH RIVER	0	935
TOTALS:	0	1,637,087

*** NET COMBUSTION CAPACITY: (1,637,087)

- In this table, on-site treatment capacity is expressed in terms of "available" capacity rather than "maximum" capacity.

- Several DOE facilities do have combustion units. The treatment capacity of these units has been assigned to mixed radioactive wastes other than those containing First Third, Second Third, or Third Third wastes.

- For the purposes of the capacity analysis for this proposed rule available combustion capacity is zero.

TABLE B-2(d)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT/TREATMENT TECHNOLOGY = NEUTRALIZATION *****

Affected waste codes: D002

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	103,963	104,106
ARGONNE NATIONAL LAB - W	0	0
BROOKHAVEN NATIONAL LAB	70,013	314,583
FMPC	0	264
HANFORD	0	11,507,219
IDAHO NATIONAL ENGINEERING LAB	0	1,556,031
ITRI	0	2,492
KANSAS CITY	0	0
LIVERMORE - SNL	0	5
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	11,889	54,821
PANTEX	0	0
PINELLAS	0	0
ROCKY FLATS	0	0
SANDIA NATIONAL LAB	0	0
SAN - LLNL	20,819	2,556
SAVANNAH RIVER	0	12,629,663
TOTALS:	206,684	26,171,740

*** NET NEUTRALIZATION CAPACITY: (25,965,056)

* No neutralization treatment capacities were provided.
In cases where DOE indicates current treatment is neutralization, the standard annual generation rate of the waste stream is used as the capacity of the treatment unit. Wastes in inventory are assumed to be untreated.

TABLE B-2(e)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT/TREATMENT TECHNOLOGY = VITRIFICATION *****

Affected waste codes: D004 nonwastewaters
D010 nonwastewaters

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	0
ARGONNE NATIONAL LAB - W	0	0
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	0
HANFORD	0	7,903
IDAHO NATIONAL ENGINEERING LAB	0	0
ITRI	0	0
KANSAS CITY	0	0
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	16,659
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	0
PANTEX	0	0
PINELLAS	0	0
ROCKY FLATS	0	0
SANDIA NATIONAL LAB	0	2,925
SAN - LLNL	0	147
SAVANNAH RIVER	0	0
TOTALS:	0	27,634

*** NET VITRIFICATION CAPACITY: (27,634)

TABLE B-2(f)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT/TREATMENT TECHNOLOGY = ALKALINE CHLORINATION *****

Affected waste codes: D003

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	0
ARGONNE NATIONAL LAB - W	0	3,276
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	0
HANFORD	0	3,951
IDAHO NATIONAL ENGINEERING LAB	0	740,908
ITRI	0	0
KANSAS CITY	0	0
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	0
PANTEX	0	0
PINELLAS	0	0
ROCKY FLATS	0	0
SANDIA NATIONAL LAB	0	4,522
SAN - LLNL	0	358
SAVANNAH RIVER	0	34,580
TOTALS:	0	787,595

*** NET ALKALINE CHLORINATION CAP (787,595)

TABLE B-2(g)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT/TREATMENT TECHNOLOGY = TREATMENT OF REACTIVES *****

Affected waste codes: D003

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	0
ARGONNE NATIONAL LAB - W	0	0
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	0
HANFORD	0	0
IDAHO NATIONAL ENGINEERING LAB	0	0
ITRI	0	0
KANSAS CITY	0	0
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	0
PANTEX	0	0
PINELLAS	0	0
ROCKY FLATS	0	0
SANDIA NATIONAL LAB	0	4,767
SAN - LLNL	0	0
SAVANNAH RIVER	0	0
TOTALS:	0	4,767

*** NET CAPACITY: (4,767)

TABLE B-2(h)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT/TREATMENT TECHNOLOGY = CHEMICAL PRECIPITATION *****

Affected waste codes:	
	D004 wastewaters
	D005 wastewaters
	D006 wastewaters
	D008 wastewaters
	D010 wastewaters
	D011 wastewaters

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	0
ARGONNE NATIONAL LAB - W	0	0
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	0
HANFORD	0	0
IDAHO NATIONAL ENGINEERING LAB	0	0
ITRI	0	0
KANSAS CITY	0	0
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	0
PANTEX	0	0
PINELLAS	0	0
ROCKY FLATS	0	27
SANDIA NATIONAL LAB	0	0
SAN - LLNL	0	11,549
SAVANNAH RIVER	0	0
TOTALS:	0	11,576

*** NET CAPACITY: (11,576)

TABLE B-2(i)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT/TREATMENT TECHNOLOGY = SULFIDE PRECIPITATION **

Affected waste codes: D009 wastewaters

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	0
ARGONNE NATIONAL LAB - W	0	0
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	0
HANFORD	0	0
IDAHO NATIONAL ENGINEERING LAB	0	0
ITRI	0	0
KANSAS CITY	0	0
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	0
PANTEX	0	0
PINELLAS	0	0
ROCKY FLATS	0	0
SANDIA NATIONAL LAB	0	0
SAN - LLNL	0	0
SAVANNAH RIVER	0	51,651,100
TOTALS:	0	51,651,100

*** NET SULFIDE PRECIPITATION CAPACITY: (51,651,100)

TABLE B-2(j)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT/TREATMENT TECHNOLOGY = AMALGAMATION WITH ZINC **

Affected waste codes: D009 (elemental)

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	0
ARGONNE NATIONAL LAB - W	0	3
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	793
HANFORD	0	0
IDAHO NATIONAL ENGINEERING LAB	0	0
ITRI	0	0
KANSAS CITY	0	0
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	0
PANTEX	0	0
PINELLAS	0	0
ROCKY FLATS	0	0
SANDIA NATIONAL LAB	0	0
SAN - LLNL	0	0
SAVANNAH RIVER	0	116
TOTALS:	0	912

*** NET AMALGAMATION WITH ZINC CAPACITY (912)

TABLE B-2(k)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT/TREATMENT TECHNOLOGY - METALS RECOVERY *****

Affected waste codes: P015

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	0
ARGONNE NATIONAL LAB - W	0	0
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	246
HANFORD	0	0
IDAHO NATIONAL ENGINEERING LAB	0	143,791
ITRI	0	62
KANSAS CITY	0	0
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	0
PANTEX	0	18,499
PINELLAS	0	0
ROCKY FLATS	0	0
SANDIA NATIONAL LAB	0	0
SAN - LLNL	0	1,597
SAVANNAH RIVER	0	0
TOTALS:	0	164,195

*** NET METALS RECOVERY CAPACITY: (164,195)

TABLE B-2(1)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** BDAT/TREATMENT TECHNOLOGY = CHROMIUM REDUCTION FOLLOWED BY CHEMICAL PRECIPITATION *****

Affected waste codes: D007 wastewaters

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	0
ARGONNE NATIONAL LAB - W	0	0
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	0
HANFORD	0	0
IDAHO NATIONAL ENGINEERING LAB	0	0
ITRI	0	0
KANSAS CITY	0	0
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	0
PANTEX	0	0
PINELLAS	0	0
ROCKY FLATS	0	0
SANDIA NATIONAL LAB	0	0
SAN - LLNL	0	1,650
SAVANNAH RIVER	0	0
TOTALS:	0	1,650
*** NET CAPACITY:	(1,650)	

TABLE B-2(m)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** ALKALINE CHLORINATION FOLLOWED BY CHEMICAL PRECIPITATION *****

Affected waste codes: F007
F008
F009

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	181,164
ARGONNE NATIONAL LAB - E	0	0
ARGONNE NATIONAL LAB - W	0	0
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	6,957
HANFORD	0	0
IDAHO NATIONAL ENGINEERING LAB	0	0
ITRI	0	0
KANSAS CITY	0	0
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	0
PANTEX	0	0
PINELLAS	0	0
ROCKY FLATS	0	338,197
SANDIA NATIONAL LAB	0	4
SAN - LLNL	0	0
SAVANNAH RIVER	0	0
TOTALS:	0	526,318

*** NET CAPACITY: (526,318)

TABLE B-2(n)

DOE NET TREATMENT CAPACITY AT THE END OF 1989
(Quantities expressed in gallons)

***** ALKALINE CHLORINATION FOLLOWED BY STABILIZATION OF METALS *****

Affected waste codes: F006 nonwastewaters

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	0
ARGONNE NATIONAL LAB - E	0	0
ARGONNE NATIONAL LAB - W	0	0
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	0
HANFORD	0	0
IDAHO NATIONAL ENGINEERING LAB	0	0
ITRI	0	0
KANSAS CITY	0	0
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	0
OAK RIDGE NATIONAL LAB	0	8,096,145
PANTEX	0	0
PINELLAS	0	0
ROCKY FLATS	0	0
SANDIA NATIONAL LAB	0	0
SAN - LLNL	0	0
SAVANNAH RIVER	0	0
TOTALS:	0	8,096,145

*** NET CAPACITY: (8,096,145)

TABLE B-2(o)

DOE NET TREATMENT CAPACITY AT THE END OF 1989

(Quantities expressed in gallons)

***** SOIL AND DEBRIS *****

Affected waste codes: VARIOUS

FACILITY	MAXIMUM ON-SITE TREATMENT CAPACITY	QUANTITY REQUIRING TREATMENT
AMES LAB	0	132
ARGONNE NATIONAL LAB - E	0	1189
ARGONNE NATIONAL LAB - W	0	0
BROOKHAVEN NATIONAL LAB	0	0
FMPC	0	0
HANFORD	0	0
IDAHO NATIONAL ENGINEERING LAB	0	189,755,309
ITRI	0	0
KANSAS CITY	0	0
LIVERMORE - SNL	0	0
LOS ALAMOS NATIONAL LAB	0	0
MOUND	0	0
NEVADA TEST SITE	0	2,991,222
OAK RIDGE NATIONAL LAB	0	0
PANTEX	0	0
PINELLAS	0	0
ROCKY FLATS	0	0
SANDIA NATIONAL LAB	0	0
SAN - LLNL	0	0
SAVANNAH RIVER	0	314,925
TOTALS:	0	193,062,777

*** SOIL AND DEBRIS REQUIRING TREATMENT: (193,062,777)

ATTACHMENT B-3

REQUESTS FOR NON-DOE MIXED RADIOACTIVE WASTE GENERATION AND TREATMENT DATA: TELEPHONE LOGS

August 22, 1989
Kenneth Singh
Commonwealth of Pennsylvania, Department of Environmental Resources
Bureau of Radiation Protection, Division of Nuclear Safety
200 N. Third Street
Fulton Building, 16th Floor
P.O. Box 2063
Harrisburg, PA 17120
(717) 783-2300

- 1987 Appalachian States Compact Low-Level Radioactive Waste Survey did not get a good response for mixed radioactive wastes. No facility names or locations are provided, nor are there any data tables.
- As of January 1990, generators of radioactive wastes for disposal will have to submit quarterly reports.
- Anticipates having a mixed radioactive waste facility in Pennsylvania by 1995.

August 22, 1989
Ann Constantino
New York State Energy Research and Development Authority
Communications Department
Two Rockefeller Plaza
Albany, NY 12223
(518) 465-6251

- Sending New York State LLW Survey Report (received).

August 22, 1989
Meg Harvey
Connecticut Waste Management Service
Suite 360, 900 Asylum Ave.
Hartford, CT 06105-1904
(203) 244-2007

- Has incomplete data from calendar year 1987. Currently updating data on mixed radioactive wastes. Target date for completion of this update is Oct. 12 (received 1987 data).
- Update of 1988 report will be sent (not received).
- Data will include New England Compact information.

August 22, 1989
Melissa Young
Illinois Department of Nuclear Safety
1035 Outer Park Drive
Springfield, IL 62704
(217) 785-9900

- Her department published a report based on Illinois LLW surveys. However, the report contains little data on mixed radioactive wastes.

- Will send report and mixed radioactive waste survey data (received).

August 22, 1989
Vergil Autry
South Carolina Department of Health and Environmental Control
Office of Radiological Health
Waste Division
(803) 734-5000

- Barnwell site restricts mixed radioactive wastes from disposal.

August 22, 1989
John Vaden
Nevada State Division of Health
Carson City, NV
(702) 885-4475

- License at the Beatty site prohibits mixed radioactive waste disposal.

August 24, 1989
Susan Olsson
Assistant to the Director
Midwest Low-Level Radioactive Waste Commission
350 N. Robert Street, Room 588
St. Paul, MN 55101
(612) 293-0126

- Midwest Compact Commission conducted a survey. She will send data on mixed radioactive waste (received).

- This Compact wants its own waste disposal facility by 1993.

- Estimates that one percent of their radioactive waste stream is mixed radioactive waste.

August 28, 1989
Toby Michelina
Nuclear Regulatory Commission -- Washington State
Olympia, WA
(206) 459-6862

- Mixed wastes were stored at the Hanford disposal facility in the past, but are no longer.

August 31, 1989
Mike Elsen
State of Washington, Department of Health
Olympia, WA
(206) 753-1116

- The Hanford facility accepted scintillation fluids and some oils until 1984-85. However, its restrictions on accepting mixed radioactive wastes are now more stringent than current RCRA requirements.

August 31, 1989
Kathryn Visocki
Executive Director
Southeast Compact Commission for Low-Level Radioactive Waste Management
3901 Barrett Drive, Suite 100
Raleigh, NC 27609
(919) 781-7152

- Doesn't have much information, but will send a report (received).

September 12, 1989
Ed Jennrich and Bob Beard
Rogers and Associates Engineering Corp.
(801) 263-1600

- Indicated that Texas, which is not currently in a Compact, generates approximately 1000 cu. ft./year of mixed radioactive wastes.
- Referred to Arnie Wight of Principaled Negotiations, Inc. as well as heads of various Compacts.

October 5, 1989
Russ Huck
Southwest Compact Commission
Sacramento, CA
(916) 445-0498

- Referred to Envirosphere -- consultants for this Compact.
- No treatment capacity exists for mixed radioactive wastes at this time; this Compact is still in its infancy.

October 5, 1989
Karen Salzer
Rocky Mountain Compact Commission
Denver, CO
(303) 825-1911

- Has no information on mixed radioactive wastes for the Compact.

October 5, 1989
Jay Ringenberg
Chair of the Working Group
Central Compact Commission
Lincoln, NE
(402) 471-3380

- The five states in this Compact generate approximately 150 cu. ft. (1,119 gallons)/year of mixed radioactive waste.
- No information is available on types of hazardous constituents.
- Knows of no available treatment capacity in the Compact region.
- Referred to Gretchen McCabe (OTA), and Edgar Miller of Afton Associates (Washington, D.C.) who is a consultant to the Working Group.

October 6, 1989
Gretchen McCabe
U.S. Congress, Office of Technology Assessment
Washington, D.C.
(202) 228-6852

- New Rogers and Associates low-level mixed radioactive waste report is expected in the next six to eight weeks (at least before Congress' November recess).

- Treatment facilities are still needed for mixed radioactive wastes containing solvents.
- Believes that no commercial treatment facilities are currently allowed to treat mixed radioactive wastes legally.
- Supposedly there is a permitted storage facility in Texas.
- The Scientific Ecology Group facility in Oak Ridge, Tennessee, might build an incinerator.

October 6, 1989
Sarah Hana and Earl Liverman
LLRW Management Program
State of Washington, Department of Ecology
Mail Stop PV-11
Olympia, WA 98504-8711
(206) 459-6861

- Will send reports on mixed radioactive waste in the Northwest Compact (received).
- Knows of no commercial capacity for treatment of mixed radioactive wastes in their Compact.

October 10, 1989
Edgar Miller
Afton & Associates
Washington, D.C.
(Management Consultants of Working Group for Central Compact Commission)
(202) 547-2620

- Says there is a brokerage and processing facility in Texas that claims to be in a position to accept mixed waste.

October 10, 1989
Nancy Kerner and Tim Gould
Envirosphere
(Consultants for Southwest Compact)
Washington (State)
(206) 451-4247

- An initial California survey showed that California generates approximately 22-27,000 cu. ft. (164-200,000 gallons)/year of mixed waste.

- Mixed waste from California is usually transported to the Quadrex facility, via three brokers, where it is stored for radioactive decay, then transferred to a kiln for incineration. The waste is incinerated under the RCRA supplemental fuels exemption. Therefore, there is little waste generated that would require disposal.

- At an old nuclear power plant in Humboldt Bay, CA, oily sludges and chromium are being found.

- Named other potential mixed waste treatment facilities including:

  -- Ramp Industries, Denver, CO

  -- Nuclear Sources and Services, Inc., Houston, TX

  -- Scientific Ecology Group, Oak Ridge, TN

  -- Diversified Scientific Services, Inc., Oak Ridge, TN

October 10, 1989
Arnie Wight
Principaled Negotiations, Inc.
Amherst, New Hampshire
(603) 672-1111

- New Hampshire's mixed radioactive waste is Below Regulatory Concern.

- Referred to Miriam Muneta of the Idaho National Engineering Laboratory.

- Provided data on the annual volume of low-level radioactive waste disposed of in each State.

APPENDIX C

C. Revisions to Required Capacity Since Promulgation of the Second Third Final Rule.

Since promulgation of the Second Third final rule, EPA has received additional waste stream specific data from the Chemical Waste Management facility in Alabama. Based on an analysis of this new information, EPA has adjusted the required capacity section describing capacity analyses for the previous land disposal restrictions rules (i.e. solvents and dioxins, California list, First Third and Second Third). This appendix provides a brief summary of the Chemical Waste Management data and shows how each rule was affected by these data.

The TSDR Survey originally submitted by the Chemical Waste Management facility at Emelle, Alabama (CWM Emelle) did not contain the necessary waste stream specific data which were to be included in the capacity analysis for the proposed Third Third and past promulgated rules. EPA requested critical capacity information needed to support the land disposal restrictions and CWM Emelle responded by providing their 1987 Alabama Department of Environmental Management Facility Hazardous Waste Biennial Report and other statistical information on management of hazardous waste at the facility (this additional information is classified as CBI, and is not available in the public docket). This data was included in the TSDR Survey data base, and have been used to revise the capacity analysis for prior rules and to prepare the capacity analysis for this proposed rule.

The CWM data contain information on waste streams managed at the site in 1987, not 1986, but it is considered to be the best information available from the Emelle facility to estimate required capacity. The data include over 3,000 waste streams received or generated at the facility in 1987. The data include a brief description of the waste, the handling method, the applicable RCRA waste code(s), and the volume of the waste received or generated.

The handling method represents the disposition of the waste stream as of the end of 1987. The handling method in over 99 percent of the waste streams received and/or generated at Emelle was landfill. These waste streams require alternative treatment. Other handling methods specified were storage and thermal treatment. Because these are not land placement methods, these waste streams do not require alternative treatment.

The capacity analyses for previous rulemakings did not include Chemical Waste Management quantities requiring alternative treatment technologies. As a result, required capacity for past rules was underestimated and available capacity overestimated. Determination of available capacity for the proposed Third Third rule accounts for the sequential and cumulative effects of all previous regulations (and for projected capacity changes after 1986, as reported in the TSDR Survey). Therefore, in order to accurately assess available quantity for the Third Third rule, the required treatment capacity reported for the Solvents, California list, First Third, and Second Third rules had to be readjusted to reflect all TSDR Survey data, including CWM Emelle data. Five of the technologies considered in the Third Third Rule were affected by this adjustment. These technologies and the required capacity adjustments are presented in Table 1.

All wastes reported by the Chemical Waste Management facility were surface-disposed via landfill. Table 2 shows, for each rule, how the TSDR data including the CWM Emelle data affect the quantity of landfilled wastes that require alternative treatment. Tables 3 through 6 summarize all updates to required capacity since the Second Third Final Rule was promulgated. Unless specifically stated, all changes reflect the Chemical Waste Management data.

Table 1 Past Rule Capacity Affected By Chemical Waste Management Data For Those Technologies Included In Chemical Waste Management Data (millions of gallons/year)

Technology	Solvents	Ca. List	First Third	Second Third	Total
Alkaline Chlorination Followed by Chemical Precipitation	0	0	12	1	13
Carbon Adsorption, Followed by Chromium Reduction, and Chemical Precipitation	<1	0	0	0	0
Chemical Precipitation	0	0	0	<1	0
Chromium Reduction Followed by Chemical Precipitation	<1	0	6	<1	6
Combustion of Liquids	1	0	0	0	1
Combustion of Sludge/Solids	1	<1	2	0	3
High Temperature Metals Recovery (Not Secondary Smelting)	0	0	1[a]	0	0
Stabilization	0	0	21	0	21
Wastewater Treatment (for organics)	0	<1	0	0	0
Totals	2	0	41	1	44

Note: Quantities less than 1 million gallons are neither added nor subtracted from capacity totals.

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[a] High Temperature Metal Recovery (HTMR) was identified as the BDAT for "high zinc" K061. Because of the shortfall of HTMR capacity, the Agency granted a two-year capacity variance to the HTMR standard for "high zinc" K061. However, during this two-year variance period, the Agency is requiring that "high zinc" K061 meet the standard for "low zinc" K061, which is based on stabilization. Therefore, this additional 1 million gallons of K061 waste has already been accounted for under stabilization.

Table 2 Adjusted Landfill Quantities
Since The Second Third Final Rule
(millions of gallons/year)

Rule	Landfill Quantity In Second Third Final Rule[a]	CWM Data	Adjusted Landfill Quantity In Second Third Final Rule
Solvents	71	2	57[b]
First Third	302	41	343
Second Third	10	1	11

---

[a] Data obtained from Second Third Background Document Final Rule.

[b] For the Second Third rule, 16 million gallons of waste was assigned to the solvent rule. Because this quantity represents multisource leachate waste, it was subtracted from the solvent required capacity. This leaves 55 million gallons of land disposed waste landfilled under the solvent rule. The additional 2 million gallons comes from the CWM data.

Table 3 Solvents Rule Capacity Numbers
For Those Technologies Included In Chemical Waste Management Data
(millions of gallons/year)

Technology	Required Capacity Excluding CWM data[a]	Required Capacity Based on CWM Data	Required Capacity Including CWM data
Carbon Adsorption Followed by Chromium Reduction, and Chemical Precipitation	0	<1	<1
Chromium Reduction Followed by Chemical Precipitation	0	<1	<1
Combustion of Liquids	1	1	2
Combustion of Sludge/Solids	38	1	23[b]

---

[a] Data obtained from Second Third Background Document, Final Rule.

[b] Only 1 million gallons of CWM required capacity was added to combustion of sludge/solids. The remaining 16 million gallon difference is a solvent-contaminated wastewater treatment sludge which results from the treatment of multisource leachate. Although this quantity was included in the Solvent capacity analysis for the Second Third Rule, this quantity should be evaluated under the Third Third rule. Consequently, it is no longer included in the solvent required capacity total.

Table 4 California List Rule Capacity Numbers
For Those Technologies Included In Chemical Waste Management Data
(millions of gallons/year)

Technology	Required Capacity Excluding CWM data[a]	Required Capacity Based on CWM Data	Required Capacity Including CWM data
Combustion of Sludge/Solids	2	<1	<1[b]
Wastewater Treatment of Organics	7	<1	<1[c]

---

[a] Data obtained from Second Third Background Document, Final Rule.

[b] In the Second Third Final Rule, 2 million gallons of Third Third California List wastes were included in required capacity for combustion of sludge/solids. As this quantity is accounted for in the Third Third Rule, this 2 million gallons is no longer required under the California List rule. Subtracting this 2 million gallons leaves a zero balance. The less than 1 million gallons reported in the Third Third Rule comes from CWM data.

[c] In the Second Third Rule, 7 million gallons of Third Third California List wastes were included in required capacity for wastewater treatment of organics. As this quantity is accounted for in the Third Third rule, this 7 million gallons is subtracted from the California List Rule, leaving a zero balance. The less than 1 million gallons reported in this proposed rule comes from CWM data.

Table 5 First Third Rule Capacity Numbers
For Those Technologies Included In Chemical Waste Management Data
(millions of gallons/year)

Technology	Required Capacity Excluding CWM data[a]	Required Capacity Based on CWM Data	Required Capacity Including CWM data
Alkaline Chlorination Followed by Chemical Precipitation	0	12	25[b]
Chromium Reduction Followed by Chemical Precipitation	40	6	46
Combustion of Sludge/Solids	6-160	2	8-162
High Temperature Metals Recovery (Not Secondary Smelting)	62	1	63[c]
Stabilization	231	21	263[d]

---

[a] Data obtained from Second Third Background Document, Final Rule.

[b] Only 12 million gallons of CWM was added to the First Third required capacity total. The remaining 13 million gallons represents F006 waste that has been added since the Second Third Final Rule due to promulgation of the cyanide standard on 6/8/89.

[c] High Temperature Metals Recovery (HTMR) was identified as the BDAT for "high zinc" K061. Because of the shortfall of HTMR capacity, the Agency granted a two-year capacity variance to the HTMR standard for "high zinc" K061. However, during this two-year variance period, the Agency is requiring that "high zinc" K061 meet the standard for "low zinc" K061, which is based on stabilization. Therefore, this 1 million gallons has already been accounted for under stabilization.

[d] Only 21 million gallons of CWM was added to the First Third required capacity total. The remaining 11 million gallons represents soils that were analyzed separately in prior rules.

Table 6 Second Third Rule Capacity Numbers For Those Technologies Included In Chemical Waste Management Data (millions of gallons/year)

Technology	Required Capacity Excluding CWM data[a]	Required Capacity Based on CWM Data	Required Capacity Including CWM data
Alkaline Chlorination Followed by Chemical Precipitation[c]	2	1	5[b]
Chemical Precipitation	0	<1	<1
Chromium Reduction and Chemical Precipitation	0	<1	<1
Stabilization	2	0	4[d]

---

[a] Data obtained from Second Third Background Document, Final Rule.

[b] Of the 3 million gallons added to required capacity for alkaline chlorination followed by chemical precipitation, 1 million gallons comes from CWM data, and the remaining 2 million gallons are soil and debris.

[c] Titled alkaline chlorination in Second Third Rule.

[d] This additional 2 million gallons is soil and debris waste that was analyzed separately in the Second Third Rule, not CWM data.

APPENDIX D

Capacity Analysis by Technology Per Waste Code For Third Third Proposed Wastes

APPENDIX D

The tables in this appendix present the results of the analysis of required capacity for each alternative technology on a waste code-by-waste code basis. The tables show the amount of required treatment capacity for the wastes for which treatment standards are being proposed for the Third Third rule. The tables also total the amount of required capacity for each technology.

The original TSDR Survey data were sorted by waste code, waste description code, and type of alternative treatment required to generate these tables. Computer printouts showing the original TSDR Survey data for the Third Third promulgated wastes are contained in the "Analysis of the Required Capacity Data for the Third Third Wastes Proposed Rule" contained in the docket. The data were then combined and summarized to create the technology-specific capacity analysis tables for the Third Third proposed wastes contained in Section 2 of this document.

Table D-1 Capacity Analysis for Alkaline Chlorination
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D002[a]	0	62,400
D003[a]	151,680	11,074,160
TOTALS:	151,680	11,136,560

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[a] D002 acids and alkalines

[a] D003 cyanides

Table D-2 Capacity Analysis for Alkaline Chlorination followed by Chemical Precipitation (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
F006a	4,523,743	500,288
TOTALS:	4,523,743	500,288

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[a] F006 cyanides and metals

Table D-3 Capacity Analysis for Beryllium Recovery
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
P015	1,778	0
TOTALS:	1,778	0

Table D-4 Capacity Analysis for Carbon Adsorption Followed by Chemical Precipitation (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D004	204	0
D005	204	0
K083	0	5,000,000
U159	204	0
TOTALS:	612	5,000,000

Table D-5 Capacity Analysis for Chemical Oxidation Followed by Chemical Precipitation (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D001[b]	560	0
D002[a]	210,758	89,242,840
D003[b]	6,677,720	1,593,538,840
D004	0	640
D005	3,078	0
D006[a]	657	400,000
D007	0	400,000
D008[a]	0	400,000
D010	0	400,000
D011	612	0
P006	47,280	0
P105	480	0
P115	4,800	0
P122	0	7,920
TOTALS:	6,945,945	1,684,390,240

[b] D001 reactives, oxidizers

[a] D002 acids and alkalines

[b] D003 sulfides

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

Table D-6 Capacity Analysis for Chemical Precipitation
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D002a	1,021,257	7,001,533
D004	554,868	8,061,360
D005	8,426,348	276,420
D006a	1,341,262	128,900
D008a	12,124,068	2,206,073
D009a	914,117	1,045,600
D010	297,476	93,560,960
D011	802,043	235,760
F006b	0	3,001,731
K031	0	1,047,360
P056	0	14,040
U134	964	210,720
U151a	0	100,000
TOTALS:	25,482,403	116,890,457

[a] D002 acids and alkalines

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

[a] D009 high concentration mercury

[b] F006 treated cyanides and metals

[a] U151 high concentration mercury

Table D-7 Capacity Analysis for Chromium Reduction and Chemical Precipitation (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D002[a]	1,198,275	36,077,869
D004	61,918	16,740
D005	187,563	961,968
D006[a]	1,400,950	1,033,388
D007	59,324,019	198,233,898
D008[a]	3,053,865	1,021,185
D009[a]	35,245	63,717
D010	15,349	334,341
D011	121,414	28,860
F006[c]	541,920	1,500,865
K002	130,320	130,680
K003	130,320	0
K004	115,200	0
K005	115,200	0
K006	115,200	0
P011	0	3,600
U032	101	15,480
TOTALS:	66,546,859	239,422,591

[a] D002 acids and alkalines

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

[a] D009 high concentration mercury

[c] F006 chrome

Table D-8 Capacity Analysis for Combustion of Liquids
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D001a	6,897,000	6,897,000
D002a	37,478	104,880
D003a	1,180,422	7,004,320
D004	659	48,160
D006a	59,320	10,920
D007	91,432	31,300
D008a	223,823	10,380
D010	1,369	9,600
D012	0	2,333,333
D013	0	2,333,333
D014	1,920,000	2,390,213
D015	0	2,333,333
D016	0	2,333,333
D017	0	2,333,333
K032	0	5,360
K097	0	26,480
K105	4,560	0
P003	240	0
P005	0	27,000
P020	317	100,000
P024	480	0
P048	0	110,040
P050	0	377,533
P051	0	9,216
P059	0	377,533
U001	0	534,480
U002	577	100,000
U008	100	0
U009	45,840	23,760
U012	1,640	100,000
U019	3,935	779,760
U031	134	100,000
U037	0	33,120
U043	5,480	0
U044	4,320	129,600
U045	0	17,600
U048	183	0
U051	24,417	0
U052	93,141	0
U057	160	0
U066	1,324	0
U067	26	0
U070	456	100,000
U073	240	0
U074	0	50,400
U077	311	0
U080	2,658,635	2,754,520
U105	0	100,000
U106	0	100,000
U108	4,085	0

U112	273	254
U113	0	4,500
U118	0	240
U121	370	0
U122	7,968	100,000
U123	1,533	0
U125	251	0
U131	103	0
U138	0	100,000
U140	40	1,000,000
U142	240	0
U154	30,183	1,738
U157	0	100,000
U158	41	0
U159	2,036	3,780
U161	1,581	0
U162	4,320	100,000
U165	85	540
U169	1,054	100,000
U170	26,640	342,000
U180	240	0
U185	0	1,000,000
U188	3,885	200,000
U192	0	100,000
U196	480	0
U197	0	100,000
U201	23	0
U210	2,331	1,000,000
U211	12,551	111,520
U220	31,346	29,530
U225	12	0
U226	5,640	100,000
U227	2,658,120	2,654,520
U228	1,493	1,200
U239	158,147	160,320
U247	93	0
TOTALS:	16,213,183	41,439,982

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[a] D001 ignitables

[a] D002 acids and alkalines

[a] D003 cyanides

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

Table D-9 Capacity Analysis for Combustion of Sludges
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D001a	6,946,818	0
D002a	26,192	0
D003c	85,404	0
D004	65,555	0
D006a	135,211	0
D007	533,487	0
D008a	459,209	0
D010	4,146	0
F019	1,680	0
K035	1,920	0
K073	1,723	0
P048	2,549	0
P077	4,560	0
P088	240	0
U004	139	0
U012	303	0
U019	2,018	0
U050	461	0
U051	13,604	0
U080	290	0
U105	2,160	0
U122	29	0
U144	19	0
U159	36	0
U165	8,330	0
U188	6,553	0
U210	123	0
U211	171	0
U220	12,716	0
U226	384	0
U228	261	0
U239	12,469	0
TOTALS:	8,328,760	0

[a] D001 ignitables

[a] D002 acids and alkalines

[c] D003 explosives, reactives

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

Table D-10 Capacity Analysis for Combustion of Solids (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D001a	5,779,183	0
D002a	162,640	0
D004	57,759	0
D006a	130,954	0
D007	260,620	0
D008a	300,133	0
D010	1,952	0
D012	452,131	0
D013	442,885	0
D014	10,403	0
D015	1,246	0
D016	223,613	0
D017	441,973	0
K021	16,951	0
K085	99,600	0
P001	16	0
P004	1,981	0
P005	1,476	0
P020	20,100	0
P024	3,120	0
P037	6,633	0
P048	1,415	0
P050	6,065	0
P051	6,404	0
P059	1,307	0
P077	24	0
P088	821	0
P123	1,680	0
U001	31	0
U002	2,252	0
U003	109	0
U005	89	0
U008	1,586	0
U009	2,907	0
U012	8,370	0
U019	928	0
U022	1,574	0
U029	665	0
U030	339	0
U031	11,594	0
U036	7,821	0
U037	5,844	0
U039	61	0
U043	240	0
U044	5,886	0
U048	37	0
U051	74,547	0
U052	1,090	0
U057	16	0
U061	6,326	0

U067	48	0
U070	53	0
U071	800	0
U072	219,865	0
U073	225	0
U075	240	0
U076	8,880	0
U077	12,240	0
U078	480	0
U079	16	0
U080	14,786	0
U081	11,381	0
U082	19	0
U083	3,920	0
U093	60	0
U101	9,280	0
U105	478	0
U106	60	0
U112	1,794	0
U117	30	0
U118	827	0
U120	158	0
U122	39,590	0
U123	1,422	0
U126	26,549	0
U127	743	0
U129	1,597	0
U131	144,000	0
U134	24	0
U140	30	0
U144	1,797	0
U147	14,550	0
U154	2,755	0
U158	252,464	0
U159	31,651	0
U162	1,034	0
U165	29,880	0
U167	404	0
U169	527	0
U170	297	0
U181	314	0
U182	1,520	0
U185	37	0
U188	234,340	0
U192	2,438	0
U196	1,335	0
U201	144	0
U208	48	0
U209	4,800	0
U210	4,159	0
U211	2,400	0
U213	240	0
U220	89,807	0
U226	9,976	0
U228	3,660	0
U239	65,271	0
U247	336	0
U248	13,525	0
TOTALS:	9,834,701	0

Table D-11 Capacity Analysis for Incineration of Liquids
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D002a	0	24,000
D005	33,705	0
D011	4,489	8,540
K086	0	237,600
P057	0	9,216
P064	36	0
P069	240	100,000
P075	0	1,440
P102	0	84,240
U006	503	0
U007	0	100,000
U008	0	100,000
U034	0	17,600
U047	72	0
U055	0	100,000
U056	0	12,624
U092	240	0
U103	12	1,560
U109	2,160	0
U122	1,494	0
U123	286	0
U133	1,450	100,000
U147	0	480
U154	0	339,600
U156	1,440	0
U160	0	12
U194	0	9,120
U200	0	315,600
U219	76	240
U244	0	13,920
TOTALS:	46,203	1,575,792

[a] D002 acids and alkalines

Table D-12 Capacity Analysis for Incineration of Sludges (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D004	6	0
D005	23,545	0
D007	6	0
D008a	3	0
D009a	3	0
D011	21,845	0
P012	31	0
P022	6,720	0
P075	87	0
P108	29	0
U007	516	0
U240	1,440	0
U244	140	0
TOTALS:	54,371	0

[a] D008 lead < 2.5 %, non-battery

[a] D009 high concentration mercury

Table D-13 Capacity Analysis for Incineration of Solids (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D005	64,858	0
D011	265	0
K017	68,400	0
P002	100	0
P014	17,572	0
P018	955	0
P022	6,380	0
P028	720	0
P031	191	0
P047	5,265	0
P058	80	0
P064	1,010	0
P066	11,902	0
P067	66	0
P070	98	0
P081	480	0
P093	42	0
P105	164	0
P108	5,732	0
U007	23,404	0
U010	112	0
U014	24	0
U021	4,199	0
U055	205,953	0
U056	789	0
U103	1,910	0
U114	4,134	0
U116	254	0
U119	49	0
U133	264	0
U148	44	0
U149	33,600	0
U177	1,520	0
U202	60	0
U218	60	0
U219	1,817	0
U234	41	0
U237	463	0
U238	205	0
U240	55,870	0
U244	86	0
U249	55	0
TOTALS:	519,193	0

Table D-14 Capacity Analysis for Mercury Retorting
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D002a	38,262	0
D005	34,803	0
D006a	49,489	493
D007	49,600	494
D008a	200,088	1,195
D009a	2,047,161	19,063
D011	392	0
K071	5,939,122	0
K106a	446,236	0
P092	1,776	0
U007	1	0
U008	2	0
U019	6	0
U144	2	0
U151a	33,759	0
TOTALS:	8,840,699	21,245

[a] D002 acids and alkalines

[a] F006 cyanides and metals

[a] D008 lead < 2.5 %, non-battery

[a] D009 high concentration mercury

[a] K106 high concentration mercury

Table D-15 Capacity Analysis for Neutralization (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D002a	21,975,340	1,638,365,360
TOTALS:	21,975,340	1,638,365,360

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[a] D002 acids and alkalines

Table D-16 Capacity Analysis for Nickel Recovery
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
P073	7,200	0
TOTALS:	7,200	0

Table D-17 Capacity Analysis for Secondary Smelting (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D002a	9,070	0
D005	7,680	0
D006a	565,789	0
D008b	573,479	0
D008c	499,944	0
TOTALS:	1,655,962	0

[a] D002 acids and alkalines

[a] D006 cadmium

[b] D008 lead acid batteries

[c] D008 lead > 2.5 %

Table D-18 Capacity Analysis for Stabilization (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D002[a]	65,752	0
D006[a]	9,867,329	0
D007	11,316,562	0
D008[a]	49,494,459	0
D011	94,357	0
F019	5,202,262	0
F024	16,945	0
K002	82,320	0
K003	82,320	0
K006	91,920	0
K069	41	0
K083	15,146	631
P115	48	0
P119	106	0
P120	63,951	0
U146	287	0
U214	16	0
U217	240	0
TOTALS:	76,394,061	631

[a] D002 acids and alkalines

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

Table D-19 Capacity Analysis for Stabilization of Incinerator Ash (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring A[illegible]native Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D005	11,824	0
D006[a]	233,845	17
D007	272,685	874
D008[a]	275,594	10
D011	2,207	0
F019	168	0
K017	12,528	0
K021	3,390	0
K086	0	2,376
P064	1,212	0
U004	14	0
U006	5	0
U019	39	0
U044	24	0
U051	16,513	0
U077	768	0
U080	3	0
U122	0	2
U144	372	0
U158	49,248	0
U181	63	0
U188	2,517	0
U220	40	0
U239	114	0
TOTALS:	883,173	3,279

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

Table D-20 Capacity Analysis for Stabilization of Retort Slag (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D005	34,632	0
D006a	45,802	657
D007	76,519	658
D008a	1,333,835	2,060
D011	1,406	0
U007	9	0
U008	9	0
U019	63	0
U144	364	0
TOTALS:	1,492,639	3,375

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

Table D-21 Capacity Analysis for Stabilization of Scrubber Water Treatment Sludge (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D005	7,158	0
D006a	23,131	17
D007	31,387	874
D008a	213,625	10
D011	266	24
F019	17	0
K017	626	0
K021	170	0
K086	0	2,376
P064	60	0
U004	1	0
U006	5	0
U019	39	0
U044	1	0
U051	1,125	0
U077	38	0
U080	3	0
U122	0	2
U158	2,462	0
U181	3	0
U188	126	0
U220	40	0
U239	44	0
TOTALS:	280,327	3,303

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

Table D-22 Capacity Analysis for Stabilization of Wastewater Treatment Sludge (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D005	6,325,600	14,723
D006a	574,809	15,847
D007	44,479,848	2,475,797
D008a	2,128,898	31,931
D011	153,955	366
F006a	51,156	0
F019	461,732	0
K002	23,605	2,614
K003	23,605	0
K004	1,152	0
K005	1,152	0
K006	1,152	0
U032	1,426	235
U159	2	0
U188	0	150,000
TOTALS:	54,228,092	2,691,513

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

Table D-23 Capacity Analysis for Thermal Recovery
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
P087	2,600	0
TOTALS:	2,600	0

Table D-24 Capacity Analysis for Treatment of Reactives followed by Chrome Reduction and Chemical Precip
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D001b	31,000	0
D002a	610,976	97,601,820
D003c	1,089,444	97,604,340
D005	54,540	0
D006a	68,569	4,980
D007	65,851	5,880
D008a	0	40,020
D009a	0	35,040
TOTALS:	1,920,380	195,292,080

[b] D001 reactives, oxidizers

[a] D002 acids and alkalines

[c] D003 explosives, reactives

[a] F006 cyanides and metals

[a] D008 lead < 2.5 %, non-battery

[a] D009 high concentration mercury

Table D-25 Capacity Analysis for Vitrification
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D001b	655	0
D002a	157,264	0
D003a	23,380	0
D004	12,072,431	150,796
D005	1,206,300	14
D006a	1,753,273	5,441
D007	1,872,888	5,190
D008a	2,161,060	10,204
D009a	1,080,616	0
D010	1,728,461	935,812
D011	1,309,530	228
K031	620,258	10,474
K084	213,912	0
P010	1,117	0
P011	2,048	72
P012	3,228	0
P108	6	0
U022	461	0
U051	73	0
U120	26	0
U144	2	0
U159	2	0
U169	4	0
U188	6	0
U204	110	0
TOTALS:	24,207,111	1,118,231

[b] D001 reactives, oxidizers

[a] D002 acids and alkalines

[a] D003 cyanides

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

[a] D009 high concentration mercury

Table D-26 Capacity Analysis for Wet Air Oxidation
(Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D002[a]	0	55,990,320
F019	6,068,279	0
K011	0	433,204,160
K013	0	407,166,320
K014	0	130,950,320
TOTALS:	6,068,279	1,027,311,120

[a] D002 acids and alkalines

Table D-27 Capacity Analysis for Wet Air Oxidation Followed by Chemical Precipitation (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
F019	1,440	1,440
TOTALS:	1,440	1,440

Table D-28 Capacity Analysis for Wet Air Oxidation Followed by Chromium Reduction (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
D007	20,967	0
F019	52,181	0
TOTALS:	73,148	0

Table D-29 Capacity Analysis for Wet Air Oxidation followed by Carbon Adsorption (Excluding Soil and Debris)

Type of Alternative Treatment/Recovery	Surface-disposed Volume Requiring Alternative Capacity (gallons/year)	Deepwell-disposed Volume Requiring Alternative Capacity (gallons/year)
P058	0	12,720

APPENDIX E

Capacity Analysis by Technology Per Waste Code For Contaminated Soil Wastes

APPENDIX E

The tables in this appendix present the results of the analysis of required capacity for each alternative technology for contaminated soils. The tables show the amount of required capacity for each technology.

To generate these tables, the original TSDR Survey data were sorted by waste code, waste description code (i.e., those described as soils), and type of alternative treatment required. Computer printouts showing the original TSDR Survey data for the Third Third proposed wastes are contained in the "Analysis of Required Capacity Data for the Third Third Wastes Proposed Rule" contained in the docket. The data were then combined and summarized to create the technology-specific capacity analysis tables for contaminated soils contained in Section 2 of this document.

Table E-1 Capacity Analysis for Chromium Reduction and Chemical Precipitation of Soils (Soil and Debris only)

Type of Alternative Treatment/Recovery	Volume Requiring Alternative Capacity (gallons/year)
D002[a]	142,939
D004	88,512
D005	209,811
D006[a]	336,396
D007	982,669
D008[a]	382,315
D009[a]	5,370
TOTALS:	2,148,012

[a] D002 acids and alkalines

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

[a] D009 high concentration mercury

Table E-2 Capacity Analysis for Incineration of Soil/Debris
(Soil and Debris only)

Type of Alternative Treatment/Recovery	Volume Requiring Alternative Capacity (gallons/year)
D001a	1,489,128
D002a	2,400
D003c	3,160
D004	1,051
D005	1,791
D006a	12,906
D007	63,646
D008b	59,162
D012	164,958
D013	381,892
K035	310,560
P012	27
P020	50,880
P022	138,720
P037	403
P047	8,625
P048	1,920
P051	87,211
P054	1,200
P064	5,050
P070	437,520
P108	5,625
P122	960
P123	477
U002	22,999
U003	720
U008	95,203
U009	221,211
U019	131,001
U022	461
U031	602
U036	877
U044	382
U050	461
U051	1,881,258
U052	617,510
U060	17,149
U061	17,178
U070	480
U080	4,419
U103	1,863
U105	11,398
U106	10,920
U108	720
U114	4,347
U118	180
U120	461
U122	27,128
U123	1,677
U125	4,320

U129	403
U147	1,200
U154	7,440
U159	375,972
U161	7,440
U162	127,981
U165	438,098
U181	315
U188	470,942
U220	312,619
U228	44,280
U239	290,492
U248	480
TOTALS:	8,381,859

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[a] D001 ignitables

[a] D002 acids and alkalines

[c] D003 explosives, reactives

[a] D006 cadmium

[b] D008 lead acid batteries

Table E-3 Capacity Analysis for Mercury Retorting of Soil/Debris
(Soil and Debris only)

Type of Alternative Treatment/Recovery	Volume Requiring Alternative Capacity (gallons/year)
D002a	60
D005	1,140
D006a	5,024
D007	5,084
D008a	441,212
D009a	3,051,369
K106a	9,600
U151a	4,242
U242	60
TOTALS:	3,517,791

[a] D002 acids and alkalines

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

[a] D009 high concentration mercury

[a] K106 high concentration mercury

[a] U151 high concentration mercury

Table E-4 Capacity Analysis for Neutralization of Soil/Debris
(Soil and Debris only)

Type of Alternative Treatment/Recovery	Volume Requiring Alternative Capacity (gallons/year)
D002[a]	23,401
TOTALS:	23,401

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[a] D002 acids and alkalines

Table E-5 Capacity Analysis for Reactives Treatment of Soil/Debris
(Soil and Debris only)

Type of Alternative Treatment/Recovery	Volume Requiring Alternative Capacity (gallons/year)
D003c	130,080
TOTALS:	130,080

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[c] D003 explosives, reactives

Table E-6 Capacity Analysis for Stabilization of Retort Slag (Soils) (Soil and Debris only)

Type of Alternative Treatment/Recovery	Volume Requiring Alternative Capacity (gallons/year)
D005	12,252
D006[a]	6,699
D007	6,699
TOTALS:	25,650

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[a] D006 cadmium

Table E-7 Capacity Analysis for Stabilization of Soil/Debris
(Soil and Debris only)

Type of Alternative Treatment/Recovery	Volume Requiring Alternative Capacity (gallons/year)
D001[a]	27
D002[a]	2,787
D005	273,833
D006[a]	250,461
D007	27,856
D008[a]	9,631,111
D010	0
F019	29,997
P011	0
P012	0
P110	480
P122	0
U032	1,440
U051	1,862,445
U052	10,930
U144	267
U151[a]	80
TOTALS:	12,091,714

[a] D001 ignitables

[a] D002 acids and alkalines

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

[a] U151 high concentration mercury

Table E-8 Capacity Analysis for Stabilization of Wastewater Treatment Sludge and Soils (Soil and Debris only)

Type of Alternative Treatment/Recovery	Volume Requiring Alternative Capacity (gallons/year)
D006a	67,788
D007	70,277
D008a	85,683
F019	6,400
U032	6,998
TOTALS:	237,146

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

Table E-9 Capacity Analysis for Thermal Recovery from Soils
(Soil and Debris only)

Type of Alternative Treatment/Recovery	Volume Requiring Alternative Capacity (gallons/year)
P015	1,440
TOTALS:	1,440

Table E-10 Capacity Analysis for Vitrification of Soil/Debris
(Soil and Debris only)

Type of Alternative Treatment/Recovery	Volume Requiring Alternative Capacity (gallons/year)
D001a	576
D002a	680
D004	469,597
D005	40,610
D006a	43,095
D007	104,466
D008a	89,344
D009a	17,699
D010	6,694
D011	51
P011	2,880
P012	56,400
TOTALS:	832,092

[a] D001 ignitables

[a] D002 acids and alkalines

[a] D006 cadmium

[a] D008 lead < 2.5 %, non-battery

[a] D009 high concentration mercury

Table E-11 Capacity Analysis for Wet Air Oxidation of Soils
(Soil and Debris only)

Type of Alternative Treatment/Recovery	Volume Requiring Alternative Capacity (gallons/year)
F019	59,994

APPENDIX F

Documentation of Waste Volumes for Waste Codes Addressed in Previous Rules

EPA is proposing to revise or add standards for the wastewater and nonwastewater forms of several waste codes for which standards were promulgated in a previous rule. In addition, EPA is proposing standards for the waste codes for which the wastewaters or nonwastewaters have been soft hammered in a previous rule. Because waste volumes for these codes were considered in a previous capacity analysis, waste volumes for these codes were initially excluded from the Third Third capacity data. Although these volumes have been included in the baseline study, they have been reanalyzed and included in the Third Third capacity analysis for the sake of completion. This appendix presents the waste volumes for the waste codes that were considered in a previous capacity analysis. Section F.1 presents tables (Tables F-1, F-2, F-3, F-4) listing waste codes, and associated volumes disposed of waste codes which have been evaluated in previous rules. This section also includes documentation for waste codes whose volumes had been initially evaluated in the capacity analysis for a previous rule. These volumes were previously considered because they were mixed with a waste code promulgated in a previous rule. Table F.1 lists surface disposed California list HOC's and Table F.2 lists all other surface disposed wastes. Table F.3 lists the deepwell-injected California list HOC's and Table F-4 lists all remaining deepwell-injected wastes. Section F.2 lists surface disposed waste codes for for which volumes requiring alternative treatment were based on the capacity analysis from previous the rule. Discussions explain the use of volumes from past capacity analyses in the capacity analysis for Third Third proposed rule. In cases where a waste code exists in a waste stream with other wastes, volumes were divided equally between the wastes before being added to the capacity analysis.

Test F.1 Documentation for Waste Codes Evaluated in Previous Rules

TABLE F-1
REQUEST D0906A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE CODES IN BOOKS J-N
SURFACE DISPOSED CALIFORNIA LIST HOC WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	Waste Desc	1986 Quantity
OHD045243706	Envirosafe Services of Ohio, Inc. Waste Codes: D016,D017	L	35	CT	D017	B36	1,680
NYD080336241	Cecos International Waste Codes: P050	L	31	U	P050	A08	5,172
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,D002,D007, U122,U151,U044,U080,D009,P030, U144,U188,U165,P077,U007,P058	L	35	AH	P058	B88	1,200
NYD080336241	Cecos International Waste Codes: P059	L	31	V	P059	A08	48
NYD080336241	Cecos International Waste Codes: U043	L	31	AL	U043	A08	108
WA7890008967	USDOE Waste Codes: U043	L	31	D	U043	A13	240
NYD080336241	Cecos International Waste Codes: U047	L	31	AN	U047	A08	72

TABLE F-1
REQUEST D0906A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE CODES IN BOOKS J-N
SURFACE DISPOSED CALIFORNIA LIST HOC WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	Waste Desc	1986 Quantity
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,U122,U159,U002,D002,D005,D008,P104,D007,D011,U080,U228,U048	L	35	W	U048	B88	480
NYD080336241	Cecos International Waste Codes: U048	L	31	AO	U048	A08	26
NYD080336241	Cecos International Waste Codes: U067	L	31	AS	U067	A08	26
TXD069452340	Texas Ecologists Inc. Waste Codes: D001,D002,U037,U077,U067	L	35	11	U067	B36	240
AZD980665814	University of Arizona Waste Codes:D001,U002,D003,U151,U075	L	35	A	U075	B53	1,200
TXD069452340	Texas Ecologists Inc. Waste Codes: U078,U211	L	35	35	U078	B36	960
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,D002,D005,U080,U239,P030,P106,D010,U151,U228,U079,U188,U117,U077,U134	L	35	AG	U079	B88	240

TABLE F-1 (continued)
REQUEST D0906A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE CODES IN BOOKS J-N
SURFACE DISPOSED CALIFORNIA LIST HOC WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	Waste Desc	1986 Quantity
NYD080336241	Cecos International Waste Codes: U081	L	31	AY	U081	A08	9,701
NYD080336241	Cecos International Waste Codes: U082	L	31	AZ	U082	A08	19
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,D002,D006, D010,P030,U211,U057,U239,U188, U002,D007,U127,U185	L	35	AK	U127	B88	480
TXD069452340	Texas Ecologists Inc. Waste Codes: U142	L	31	T	U142	A08	240
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,D002,D006, D010,P030,U211,U057,U239,U188, U002,D007,U127,U185	L	35	AK	U185	B88	480
NYD080336241	Cecos International Waste Codes: U225	L	31	BY	U225	A80	12
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,D002,U009, U112,U237,P106,U151,U122,U196, U154,U211,U156,U165,U188,U057	L	35	AL	U237	B88	240

TABLE F-2
REQUEST D0906A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE CODES IN BOOKS J-N
ALL OTHER SURFACE DISPOSED WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	Waste Desc	1986 Quantity
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,D002,D005, D007,D009,D010,P106,P030,D008, U151,D004,U204,U134,P098,P087	L	35	AE	P087	B55	960
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,U003,U044, U154,U123,D002,P087,P012,U151, U239,U007,P106,P121	L	35	AN	P087	B88	32,160
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,D002,D007, D009,D011,U134,P106,D008,P098, P121,D005,D004,P012,P087	L	35	I	P087	B55	960
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,D002,U213, U220,U239,U144,U112,U037,U167 U021,U188,U117,U055,U228	L	35	Y	U055	B88	240
OHD087433744	Cecos International Inc. Waste Codes: K022,K083,U012, U055,U188	L	35	CO	U055	B90	8,640
OHD087433744	Cecos International Inc. Waste Codes: K022,K085,U012, U055,U188	L	35	CU	U055	B90	960

TABLE F-2 (continued)
REQUEST D0906A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE CODES IN BOOKS J-N
ALL OTHER SURFACE DISPOSED WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	Waste Desc	1986 Quantity
OHD087433744	Cecos International Inc. Waste Codes: D001,D014,U240, U093	L	35	BZ	U093	B80	240
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,D002,D005, U080,U239,P030,P106,D010,U151, U228,U079,U188,U117,U077,U134	L	35	AG	U117	B88	240
NVT330010000	US Ecology Chem Site Inc. Waste Codes: D001,D002,U213, U220,U239,U144,U112,U037,U167 U021,U188,U117,U055,U228	L	35	Y	U117	B88	240

Table F-3

REQUEST D0912A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE COES IN BOOK N
CALIFORNIA LIST DEEPWELL WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	1986 Quantity
OKD000402396	Chemical Resources Inc. Waste codes: D001, K086	N	24	D	K086	222,960
TXD027147115	Malone Service Co. Waste Codes: K086	N	20	AD	K086	14,640
TXD078432457	Celanese Chemical Co. Waste Codes: D002,D007,F001, F002,F003,F004,F005,U001,U002, U115,U154,U031,U138,U159,U133, U197,U226	N	24	B	U138	124,000,000
LAD008175390	American Cyanamid Co. Waste Codes: K011,K013,U009, U154,F001,U162,P063,P069,D008 U007,U008,U192	N	24	A	U192	188,727,600
TXD027147115	Malone Service Co. Waste Codes: U226	N	20	AB	U226	480
TXD078432457	Celanese Chemical Co. Waste Codes: D002,D007,F001, F002,F003,F004,F005,U001,U002, U115,U154,U031,U138,U159,U133, U197,U226	N	24	B	U226	124,000,000

Table F-3 (continued)
REQUEST D0912A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE COES IN BOOK N
CALIFORNIA LIST DEEPWELL WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	1986 Quantity
TXD091270017	Cecos International Inc. Waste Codes: F002;U226	N	24	E	U226	4,080
TXD027147115	Malone Service Co. Waste Codes: U228	N	20	Y	U228	1,200

Table F-4
REQUEST D0912A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE COES IN BOOK N
ALL OTHER DEEPWELL WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	1986 Quantity
LAD000618256	Cecos International Inc. Waste Codes: F006	N	20	C	F006	52,400
LAD000618256	Cecos International Inc. Waste Codes: F006,U103	N	24	C	F006	3,120
LAD000618256	Cecos International Inc. Waste Codes: D002,F006	N	24	G	F006	1,920
LAD000618256	Cecos International Inc. Waste Codes: K016,K031,F006	N	24	R	F006	339,120
LAD000618256	Cecos International Inc. Waste Codes: F002,F006	N	24	T	F006	1,680
OKD000402396	Chemical Resources Inc. Waste Codes: F006	N	20	B	F006	150,000
OKD000402396	Chemical Resources Inc. Waste Codes: F006,F007,F008	N	24	G	F006	17,040
TXD027147115	Malone Service Co. Waste Codes: F006	N	20	G	F006	12,240
TXD091270017	Cecos International Inc. Waste Codes: F006	N	20	I	F006	3,600

Table F-4 (continued)
REQUEST D0912A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE COES IN BOOK N
ALL OTHER DEEPWELL WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	1986 Quantity
LAD008213191	Rubicon Inc. Waste Codes: K083,K103,U012, U056,U169	N	24	C	K083	63,120
OHD005108477	Aristech Chemical Co. Waste Codes: K083,U012	N	24	B	K083	5,000,000
LAD008175390	American Cyanamid Co. Waste Codes: K011,K013,U009, U154,F001,U162,P063,P069,D008 U007,U008,U192	N	24	A	P069	188,727,600
LAD008175390	American Cyanamid Co. Waste Codes: K011,K013,U009, U154,F001,U162,P063,P069,D008 U007,U008,U192	N	24	A	U007	188,727,600
LAD008175390	American Cyanamid Co. Waste Codes: K011,K013,U009, U154,F001,U162,P063,P069,D008 U007,U008,U192	N	24	A	U008	188,727,600
OKD000402396	Chemical Resources Inc. Waste Codes: K062,D002,F003, F004,U008,U009	N	24	B	U008	81,120

Table F-4 (continued)
REQUEST D0912A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE COES IN BOOK N
ALL OTHER DEEPWELL WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	1986 Quantity
LAD008213191	Rubicon Inc. Waste Codes: K083,K103,U012, U056,U169	N	24	C	U056	63,120
LAD000618256	Cecos International Inc. Waste Codes: F006;U103	N	24	C	U103	3,120
LAD008213191	Rubicon Inc. Waste Codes: D002,D003,U012, U037,U105	N	24	A	U105	1,073,040
LAD008213191	Rubicon Inc. Waste Codes: U012,U105,U106 U169,U221	N	24	E	U105	26,824,080
LAD008213191	Rubicon Inc. Waste Codes: U012,U105,U106 U169,U221	N	24	E	U106	26,824,080
TXD078432457	Celanese Chemical Co. Waste Codes: D002,D007,F001, F002,F003,F004,F005,U001,U002, U115,U154,U031,U138,U159,U133, U197,U226	N	24	B	U133	124,000,000

Table F-4 (continued)
REQUEST D0912A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE COES IN BOOK N
ALL OTHER DEEPWELL WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	1986 Quantity
KYD003924198	DuPont Waste Codes: D002,F005,F024 F002,F001,U154,U162,U220,U159, U002,U044,U080,U210,U213,F003, U239	N	24	A	U162	55,000,000
LAD008175390	American Cyanamid Co. Waste Codes: K011,K013,U009, U154,F001,U162,P063,P069,D008 U007,U008,U192	N	24	A	U162	188,727,600
TXD027147115	Malone Service Co. Waste Codes: D001,U165	N	24	AA	U165	240
TXD027147115	Malone Service Co. Waste Codes: D001,U031,U165, U159	N	24	R	U165	1,680
LAD008213191	Rubicon Inc. Waste Codes: K083,K103,U012, U056,U169	N	24	C	U169	63,120
LAD008213191	Rubicon Inc. Waste Codes: U012,U105,U106, U169,U221	N	24	E	U169	26,824,080

Table F-4 (continued)
REQUEST D0912A
DATA SOURCE: TSDR SURVEY CAPACITY DATA SET
WASTE STREAMS WITH SPECIFIED WASTE COES IN BOOK N
ALL OTHER DEEPWELL WASTES
NON-CBI FACILITIES ONLY
ALL VOLUMES ARE IN GALLONS

Facility ID	Facility Name	Book	Question	Key Letter	Waste Code	1986 Quantity
TXD078432457	Celanese Chemical Co. Waste Codes: D002,D007,F001, F002,F003,F004,F005,U001,U002, U115,U154,U031,U138,U159,U133, U197,U226	N	24	B	U197	124,000,000
KYD003924198	DuPont Waste Codes: D002,F005,F024 F002,F001,U154,U162,U220,U159, U002,U044,U080,U210,U213,F003, U239	N	24	A	U213	55,000,000

F.2 Documentation On the Use of Volumes From Previous Capacity Analysis

This section lists those waste codes and associated volumes that were obtained from the background documents from previous capacity analyses. These volumes were reevaluated for the proposed Third Third rule because of BDAT revisions or additions from the background documents from the previous capacity analysis.

Waste Code	Total Quantity	Quantity Requiring Treatment Capacity
F024	81,025[a]	8,785
K069 (calcium sulfate)	41[b]	41
K071	3,886,584[c] 2,052,538[d]	5,939,122
K083	75,732[e]	15,146

In the Second Third rule, 8,062 gallons/year of F024 waste was assigned to stabilization of incinerator ash and 723 gallons/year was assigned to stabilization of scrubber water treatment sludge, both after incineration of wastewaters and nonwastewaters. EPA is proposing BDAT standards for new nonwastewaters metal constituents based on stabilization. Therefore, the volumes of F024 waste have been 'worst cased' and re-assigned to stabilization in the Third Third capacity analysis despite prior inclusion in the baseline study.

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[a] Source: Background Document for Second Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions, Final Rule, Volume I, June 1989, p. 2-93.

[b] Source: Single generator of waste that responded to Waste Treatment Branch.

[c] Source: Background Document for First Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions, Final Rule, August 1988, p. 2-75.

[d] Chemical Waste Management data - Emelle, AL

[e] Background Document for First Third Wastes to Support 40 CFR Part 268 Land Disposal Restrictions, Final Rule, August 1988, p. 2-77.

In the First Third rule, standards were promulgated for K071 wastewaters and nonwastewaters, the total volumes of which were assigned to the treatment train acid leaching, chemical oxidation, and dewatering of sludges and sulfide precipitation of metals in effluent. Today, EPA is proposing a BDAT technology revision to thermal recovery for K071 nonwastewaters. EPA is 'worst casing' the nonwastewater volumes requiring alternative treatment by re-assigning the entire volume of K071 (included in the baseline analysis) to thermal recovery. In addition, 2,052,538 gallons/year of K071 nonwastewaters which which entered the TSDR Survey since the promulgation of the First Third final rule is also being added to the capacity data set.

In the First Third rule, the 'no land disposal' restriction was promulgated for K083 nonwastewaters based on the performance of incineration. EPA is proposing to revoke this restriction and propose concentration restrictions based on incineration for organics and stabilization for inorganics. Based on the 75,732 gallons/year assigned to combustion in the First Third rule, 15,146 gallons/year is being assigned to stabilization in the Third Third rule.

For K069 non-calcium sulfate nonwastewaters, EPA is proposing recycling as a method in place of the 'no land disposal based on recycling' restrictions promulgated in the First Third rule. However, since recycling is not appropriate for calcium sulfate nonwastewaters, EPA is proposing stabilization as a BDAT. Through comments, EPA has identitfied a single generator of this waste. Therefore, the volume generated by this one generator has been added to the capacity data set and assigned to stabilization.

Appendix G

Documentation for California List HOCs

The California list final rule for Halogenated Organic Compounds (HOCs) was not waste code specific, but instead regulated all hazardous wastes containing HOCs above a specified concentration. Consequently, the Agency's capacity analysis for HOCs included some Third Third wastes. Today's proposed rule is waste code specific; therefore, some overlap exists between the California list final rule and the Third Third proposed rule. In addition, some of the technologies to which Third Third wastes were assigned for the California list final rule may no longer be appropriate as a result of today's proposal.

The Agency has therefore decided to reanalyze all California list HOC wastes subject to this proposal and has included these wastes in the estimates of required capacity as a result of the Third Third proposed rule. The following tables present these wastes, their TRD groups, and volumes requiring alternative treatment capacity; Table I-1 listing the surface disposed wastes, Table I-2 listing the deepwell injected wastes. In order to avoid double counting these wastes, the Agency has subtracted their volumes from required capacity estimates for the California list final rule, and has rendered the capacity to which these wastes were assigned under the California list final rule as available for the Third Third proposed rule.

TABLE G-1
REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
SURFACE DISPOSED CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD		1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
			1986 Vol	1988 Vol				
D012	B02	0	144,000	144,000	144,000	2	1 2	144,000 0
D012	B44	500,000	0	0	0			0
D012	B64	0	16,800	16,800	16,800	2	1 2	0 0
D012	B80	0	288,000	288,000	288,000	2	1 2	0 0
D013	B02	960	0	0	0			0
D013	B02	0	720,000	720,000	720,000	2	1 2	720,000 0
D013	B44	500,000	0	0	0			0
D013	B70	480	0	0	0			0
D013	B80	0	291,120	291,120	291,120	2	1 2	0 0
D014	B02	0	864,000	864,000	864,000	2	1 2	864,000 0

REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
SURFACE DISPOSED CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD 1986 Vol	With TRD 1988 Vol	1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
D014	B80	0	240	240	240	2	1 2	0 0
D015	B	7,968	0	0	0			0
D015	B02	0	720,000	720,000	720,000	2	1 2	720,000 0
D015	B56	0	720	720	720	1	1	0
D016	B02	0	720,000	720,000	720,000	2	1 2	720,000 0
D016	B64	0	11,520	11,520	11,520	2	1 2	0 0
D016	B70	0	240	240	240	1	1	0
D016	B80	0	187,680	187,680	187,680	2	1 2	0 0
D016	B86	0	240	240	240	1	1	0
D016	B90	0	240	240	240	1	1	0
K085	A07	0	98,640	98,640	98,640	39	1A 2A	0

REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
SURFACE DISPOSED CALIFORNIA LIST HOC'S-
SINGLE WASTE CODES ONLY BY WASTE CODE

Waste Code	Waste Desc	No TRD	With TRD		1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
		1986 Vol	1986 Vol	1988 Vol				
K105	A	0	0	0	0			0
K105	A05	0	4,560	4,560	4,560	21	23	0
							5	0
							21	0
							22	0
							8	0
P024	A01	0	480	480	480	3	1B	0
							2B	0
P024	A08	0	2,880	2,880	2,880	2	1	0
							2	0
P024	A08	0	240	240	240	2	1	0
							2	0
P028	A08	0	720	720	720	2	1	0
P037	A08	0	240	240	240	1	1	0
P123	A08	0	1,200	1,200	1,200	39	1A	0
							2A	
U006	A01	0	1,920	1,920	1,920	3	1B	1,920
							2B	0
U006	A05	1	0	0	0			0

REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
SURFACE DISPOSED CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD 1986 Vol	With TRD 1988 Vol	1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
U030	A11	0	240	240	240	2	1 2	0 0
U036	A08	0	4,080	4,080	4,080	2	1 2	0
U036	A11	0	960	960	960	2	1 2	0
U044	A05	13	0	0	0			0
U044	A08	0	4,320	4,320	4,320	3	1B 2B	0
U044	A08	0	240	240	240	3	1B 2B	240 0
U061	A08	0	3,600	3,600	3,600	2	1 2	0 0
U061	A08	0	480	480	480	2	1 2	0 0
U072	A08	0	218,160	218,160	218,160	2	1 2	0 0

REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
SURFACE DISPOSED CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD		1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
			1986 Vol	1988 Vol				
U072	AEB	0	240	240	240	2	1 2	0 0
U073	A08	0	240	240	240	3	1B 2B	0 0
U076	A08	0	8,880	8,880	8,880	2	1 2	0 0
U080	A	1,440	0	0	0			0
U080	A05	23	0	0	0			0
U080	A08	0	960	960	960	3	1B 2B	0 0
U129	A08	0	480	480	480	2	1	0
U131	A13	0	144,000	144,000	144,000	2	1 2	0
U138	A05	10	0	0	0			0
U142	A08	0	240	240	240	2	1 2	0 0
U156	A11	0	1,440	1,440	1,440	2	1 2	0 0
U158	A	2,400	0	0	0			0

REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
SURFACE DISPOSED CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD 1986 Vol	With TRD 1988 Vol	1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
U158	A13	0	3,840	3,840	3,840	2	1 2	0 0
U209	A08	0	6,240	6,240	6,240	3	1B 2B	6,240 0
U210	A05	0	1,700	1,700	1,700	40	5 21 22 24 6	0 0 0 0 0
U210	A08	0	720	720	720	2	1 2	0 0
U210	A08	0	6,480	6,480	6,480	2	1 2	6,480 0
U211	A05	11	0	0	0			0
U211	A08	0	240	240	240	2	1 2	0
U226	A05	1	0	0	0			0
U226	A08	0	6,240	6,240	6,240	3	1B 2B	720 0
U226	A13	0	240	240	240	2	1 2	0 0

REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
SURFACE DISPOSED CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD 1986 Vol	With TRD 1988 Vol	1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
U227	A08	0	3,600	3,600	3,600	3	1B 2B	0 0
U228	A13	0	480	480	480	2	1 2	0 0
U240	A08	0	20,400	20,400	20,400	2	1 2	0 0
U240	AEF	0	720	720	720	2	1 2	0 0
D012	B80	0	146,400	146,400	146,400	1	1 2	0 0
D013	B80	0	146,400	146,400	146,400	1	1 2	0 0
D014	B	0	1,920,000	1,920,000	1,920,000	75	48 59	0 0
D014	B80	0	480	480	480	2	1 2	0 0
D014	B90	0	0	0	0	2	1 2	0 0
D014	B80	0	0	0	0	2	1 2	0 0

REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
SURFACE DISPOSED CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD		1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
			1986 Vol	1988 Vol				
D015	B	2,256	0	0	0			0
D016	B64	1,168,800	0	0	0			0
K017	B82	0	5,760	5,760	5,760	2	1	0
							2	0
K017	B82	0	62,640	62,640	62,640	65	41	0
							7	0
K116	B64	93,578,880	0	0	0			0
P004	B89	0	336	336	336	2	1	0
							2	0
P037	B89	0	336	336	336	2	1	0
							2	0
P123	B81	0	480	480	480	2	1	0
							2	0
U036	B80	0	0	0	0	2	1	0
							2	0
U036	B89	0	336	336	336	2	1	0
							2	0
U071	B89	0	480	480	480	2	1	0
							2	0
U072	B89	0	480	480	480	2	1	0
							2	0

REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
SURFACE DISPOSED CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD		1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
			1986 Vol	1988 Vol				
U080	B36	0	136,956	136,956	136,956	1	1	0
U240	B	0	0	0	0	1	1	0
U240	B80	0	240	240	240	2	1 2	0 0
U037	B64	1,073,040	0	0	0			0
U037	B89	0	3,180	3,180	3,180	2	1 2	0 0
U044	B89	0	288	288	288	2	1 2	0 0
U071	B89	0	320	320	320	2	1 2	0 0
U072	B89	0	320	320	320	2	1 2	0 0
U077	B08	52,895,520	0	0	0			0
U080	B	1,200	0	0	0			0
U080	B02	0	2,654,520	2,654,520	2,654,520	5	5 21 22	0 0 0
U080	B89	0	3,468	3,468	3,468	2	1 2	0 0

REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
SURFACE DISPOSED CALIFORNIA LIST HOC'S-
SINGLE WASTE CODES ONLY BY WASTE CODE

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD 1986 Vol	With TRD 1988 Vol	1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
U121	B02	2,017,560	0	0	0			0
U129	B89	0	336	336	336	2	1 2	0 0
U158	B42	0	246,240	246,240	246,240	20	7	0
U192	B81	0	1,440	1,440	1,440	2	1 2	0 0
U208	B89	0	48	48	48	2	1 2	0 0
U209	B89	0	4,800	4,800	4,800	2	1 2	0 0
U210	B89	0	3,180	3,180	2	1 2	0 0	
U211	B89	0	608	608	608	2	1 2	0 0
U226	B02	2,017,560	0	0	0			0
U226	B89	0	48	48	48	2	1 2	0 0
U226	B90	0	9,120	9,120	9,120	2	1 2	0 0

REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
SURFACE DISPOSED CALIFORNIA LIST HOC'S-
SINGLE WASTE CODES ONLY BY WASTE CODE

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD 1986 Vol	With TRD 1988 Vol	1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
U227	B02	0	2,654,520	2,654,520	2,654,520	5	5	0
							21	0
							22	0
U228	B89	0	3,180	3,180	3,180	2	1	0
							2	0
U240	B81	0	1,440	1,440	1,440	2	1	0
							2	0
U247	B89	0	336	336	336	2	1	0
							2	0

TABLE G-2
REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE
UNDERGROUND INJECTION WELL ONLY

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD 1986 Vol	With TRD 1988 Vol	1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
D014	B01	0	56,880	56,880	56,880	19	5	0
							21	0
							22	0
							3	0
							4	0
K033	A07	0	4,237,680	4,237,680	4,237,680	40	5	0
							21	0
							22	0
							24	0
							6	0
K097	A07	0	21,120	21,120	21,120	40	5	0
							21	0
							22	0
							24	0
							6	0
P058	A05	0	12,720	12,720	12,720	35	38	12,720
U044	A13	0	12,000	12,000	12,000	3	1B	0
							2B	0
U074	A13	0	50,400	50,400	50,400	3	1B	0
							2B	0
U077	A05	0	9,594,480	9,594,480	9,594,480	40	5	0
							21	0
							22	0
							24	0
							6	0

TABLE G-2
REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE
UNDERGROUND INJECTION WELL ONLY

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD		1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
			1986 Vol	1988 Vol				
U080	A08	0	3,360	3,360	3,360	3	1B	0
							2B	0
U185	A05	0	1,000,000	1,000,000	1,000,000	21	23	0
							5	0
							21	0
							22	0
							3	0
U210	A05	0	1,000,000	1,000,000	1,000,000	40	5	0
							21	0
							22	0
							24	0
							6	0
U211	A05	0	11,520	11,520	11,520	40	5	0
							21	0
							22	0
							24	0
							6	0

TABLE G-2
REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE
UNDERGROUND INJECTION WELL ONLY

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD		1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
			1986 Vol	1988 Vol				
D012	B70	0	2,333,333	2,333,333	2,333,333	83	61	0
D013	B70	0	2,333,333	2,333,333	2,333,333	83	61	0
D014	B70	0	2,333,333	2,333,333	2,333,333	83	61	0
D015	B70	0	2,333,333	2,333,333	2,333,333	83	61	0
D016	B70	0	2,333,333	2,333,333	2,333,333	83	61	0
D017	B70	0	2,333,333	2,333,333	2,333,333	83	61	0
K017	B01	0	88,080,000	88,080,000	88,080,000	46	5	0
							6	0
							21	0
							22	0
K032	B07	0	22	22	22	10	12	0
							13	0
							49	0
K033	B07	0	22	22	22	10	12	0
							13	0
							49	0
K097	B07	0	22	22	22	10	12	0
							13	0
							49	0

TABLE G-2
REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE
UNDERGROUND INJECTION WELL ONLY

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD		1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
			1986 Vol	1988 Vol				
P050	B14	0	227,520	227,520	227,520	5	5	0
							21	0
							22	0
P051	B14	0	46,080	46,080	46,080	5	5	0
							21	0
							22	0
P059	B14	0	227,520	227,520	227,520	5	5	0
							21	0
							22	0
U034	B02	0	17,600	17,600	17,600	40	5	0
							21	0
							22	0
							24	0
							6	0
U037	B01	0	66,240	66,240	66,240	40	5	0
							21	0
							22	0
							24	0
							6	0
U037	B64	0	1,073,040	1,073,040	1,073,040	36	1B	0
							2B	1,073,040
							5	0
							21	0
							22	0

TABLE G-2
REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE
UNDERGROUND INJECTION WELL ONLY

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD		1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
			1986 Vol	1988 Vol				
U041	B01	0	30,178,560	30,178,560	30,178,560	40	5	0
							21	0
							22	0
							24	0
							6	0
U044	B02	0	17,600	17,600	17,600	40	5	0
							21	0
							22	0
							24	0
							6	0
U045	B02	0	17,600	17,600	17,600	40	5	0
							21	0
							22	0
							24	0
							6	0
U077	B01	0	30,178,560	30,178,560	30,178,560	40	5	0
							21	0
							22	0
							24	0
							6	0
U080	B02	2,654,520	2,654,520	2,654,520	2,654,520			0
U083	B01	0	30,178,560	30,178,560	30,178,560	40	5	0
							21	0
							22	0
							24	0
							6	0

TABLE G-2
REQUEST C0367G01
DATA SOURCE: TSDR SURVEY

WASTE VOLUMES (GALS) BY WASTE CODE, WASTE DESCRIPTION, AND TRD GROUP
CALIFORNIA LIST HOC'S
SINGLE WASTE CODES ONLY BY WASTE CODE
UNDERGROUND INJECTION WELL ONLY

Waste Code	Waste Desc	No TRD 1986 Vol	With TRD 1986 Vol	With TRD 1988 Vol	1988 Volume w/o Reason	TRD Group	ATR Code	Volume Assigned
U084	B01	0	30,178,560	30,178,560	30,178,560	40	5	0
							21	0
							22	0
							24	0
							6	0
U227	B02	2,654,520	2,654,520	2,654,520	2,654,520			0

Appendix H

Bibliography for Third Third Land Disposal Restrictions

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2. USEPA. 1986. U.S. Environmental Protection Agency, Office of Solid Waste. *Background document for solvents to support 40 CFR Part 268, land disposal restrictions*. Final rule. EPA Contract No. 68-01-7053. Washington, D.C.: U.S. Environmental Protection Agency.

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4. USEPA. 1988. U.S. Environmental Protection Agency, Office of Solid Waste. *Background document for First Third wastes to support 40 CFR Part 268 land disposal restrictions. Final rule*. EPA Contract No. 68-01-7053. Washington, D.C.: U.S. Environmental Protection Agency.

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APPENDIX I

MEMORANDUM ON AVAILABILITY OF SURVEYS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

DATE: November 1, 1989

SUBJECT: The National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities and National Survey of Hazardous Waste Generators

FROM: Jo-Ann Bassi
Land Disposal Branch

TO: Docket

The National Survey of Hazardous Waste Treatment, Storage, Disposal, and Recycling Facilities was conducted during 1987-1988. The Survey included about 2,500 hazardous waste facilities, i.e., facilities with RCRA permits or RCRA interim status. However, for the capacity analysis for land disposal restrictions, those facilities with land disposal (i.e., waste piles, surface impoundments, landfills, land treatment, deep wells), or with commercial processes were considered. These facilities were designated as priority facilities and the survey responses provide the basis for the capacity analysis for the land disposal restrictions rules (including the analysis of land disposal volumes requiring alternative treatment/recycling capacity, and analysis of available commercial capacity). All surveys were first screened to be classified as priority or non-priority. For the priority facilities, EPA conducted a comprehensive technical review of survey responses and a facility capacity analysis, and also developed a capacity data base. This data base was then used for the national capacity analysis for the land disposal restrictions.

Given the large amount of materials, the actual TSDR Survey booklets, all data provided in response to the Survey, all data provided in follow-up for additional information (especially on planned changes), and technical evaluation documentation are located at EPA's contractor and will be available to the public upon request to the Docket.

The National Survey of Hazardous Waste Generators was conducted in late 1987 and 1988. The survey included over 10,000 facilities throughout the United States. However, only a subset of facilities was available to support the Third Third proposed rule. Printouts containing the data used by EPA are included in a report entitled "Analysis of Generator Survey Data for the Third Third Wastes Proposed Rule," which is included in the Docket for this proposed rule. Given the large amount of materials, the actual Generator Survey booklets and technical evaluation documentation that were used for the Third Third rule are located at EPA's contractor, and will be available to the public per requests to the Docket.

APPENDIX J

ANALYSIS OF LARGE VOLUME UNDERGROUND INJECTED P AND U CODED WASTES

In support of the Third Third wastes proposed rule, the Agency conducted a special analysis of certain large volume P and U coded waste streams reported as deepwell injected in the TSDR Survey. The purpose of this analysis was to gather additional data on the generation, characteristics, and current management of these waste streams. The Agency suspected that these streams, as generated, were actually small volumes of hazardous wastes mixed with large volumes of aqueous wastes; therefore making the entire mixture hazardous.

The following facility summaries document the results of the analysis for each of the contacted facilities..

- Aristech Chemical Corporation. The facility contact stated that its P and U wastes are generated separately but share a common collection system. Furthermore, he said that some of the P and U wastes are "off-spec" products but most are spill residues. As injected, he said the wastes are composed of small amounts of P and U waste contaminated with large volumes of nonhazardous process wastewaters (the contact was unable to provide the percentage that was hazardous vs. nonhazardous). In addition, as part of the facility's wastewater treatment system prior to the well, insoluble organics are removed and recycled or reused as fuel. Finally, he said the facility was investigating whether the waste may qualify for a "de minimis" exemption.

- American Cyanamid. The contact stated that as injected the stream is 99 percent water and only hazardous because of the mixture rule. She also said many of the U codes may qualify for the deminimis exemption but they carried the codes to be safe. She said the waste is mainly generated from storm water, minor spills, and backwashing the well's filters.

- Rubison Incorporated. The contact stated that the P and U coded waste streams are mostly water as injected (although he did not know the percentage) and that the wastes are hazardous because of the mixture rule. He said the wastes are generated by minor spills, process upsets, and as scrubber water. He said they do analyze the waste prior to injection and the concentration of P and U code constituents are typically in the low part per million range.

- Calanese Chemical Company. Although this facility refused to provide detailed information without a formal written request, the contact stated that their underground injected wastes consisted of very small portions of hazardous waste mixed with large volumes of water.

- Cecos International. The facility contact stated that this waste is rainwater drained from the surface of an active landfill (it is not leachate which has percolated through a closed landfill). He said the stream is virtually all rainwater and the concentration of the U coded constituents is less than 50 parts per million. The waste is received from offsite.

In addition, one CBI facility was contacted. The facility contact stated that the waste stream reported as injected in the TSDR Survey was the result of the cleanout of a surface impoundment and consisted mainly of rainwater. He said they are still injecting wastes but that they are exclusively mixture rule wastes consisting mostly of water.

Based on the information received from these facilities, EPA believes that the actual volume of P and U wastes generated by these facilities is significantly less than the volume reported as underground injected. The Agency believes that 100,000 gallons per year is a reasonable upper estimate of the volume of these P and U wastes that are generated prior to mixture with other wastes.

Because the land disposal restrictions apply to wastes at the point of generation, the Agency believes that only the originally generated P and U wastes volumes should be used to estimate required capacity. Consequently, the Agency used 100,000 gallons per year per code as an upper estimate of the required capacity for P and U wastes at these facilities.